THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVII. No. 1451.] LONDON, MARCH 3, 1891. [43RD YEAR. Price 6d.

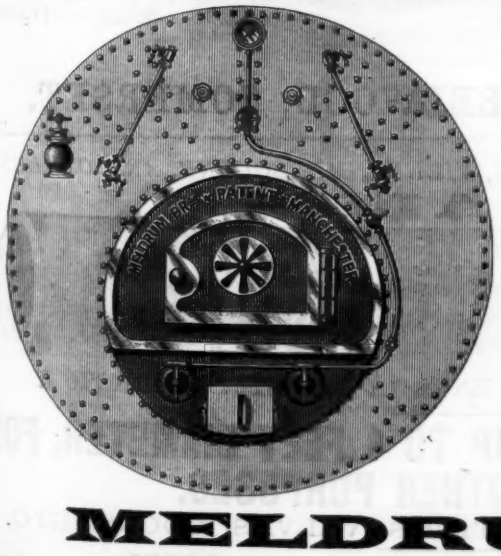
WOLSTON'S Paste and Ready Mixed for Use.
Guaranteed Free from Adulteration. **TORBAY PAINTS.**
FOR GASHOLDERS, &c., &c.
The Original "Torbay Paints" As supplied during the present and many preceding years to the LONDON GASLIGHT & COKE COMPANY.
Special Quotations to Gas Companies.
TORBAY & DART PAINT Co., Ld.,
23, Gt. George St., Westminster, S.W.
Works: DARTMOUTH, DEVON.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.
WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.
Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advertisement, p. 422.

CEMENT
EARLE'S
BEST
Portland Cement
MANUFACTURED BY
GEO. & THOS. EARLE,
HULL.
Office: 7, PIER STREET.
Works: WILMINGTON.
STORAGE CAPACITY 10,000 Tons.
ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
Telegraphic Address: "CEMENT HULL."

J. UNGAR & CO.,
Manufacturers & Patentees of every Description of
IMPROVED LAMPS
FOR
Streets, Markets, Shops, &c.
WHOLESALE DEPOT: 52, COMMERCIAL ST., LONDON, E.
We specially solicit Government and Local Board Contracts for General Lighting.

SELF-CONTAINED DUST FUEL FURNACE.



OVER 200 WORKING,
RAISING STEAM WITH COKE DUST, COAL DUST, TOWNS' REFUSE, AND OTHER WASTE FUEL.

GLASGOW: F. J. ROWAN, 121, West Regent Street.
LONDON: WM. BOBY, 16, Union Court, Old Broad Street.
GERMANY, AUSTRIA, BELGIUM, SWITZERLAND, ITALY } ALFRED WENNER, Manchester.

MELDRUM BROS.,
26, HALF STREET, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers and Contractors for the Erection of Gas-Works.

MANUFACTURERS OF IMPROVED GAS-EXHAUSTING APPARATUS.

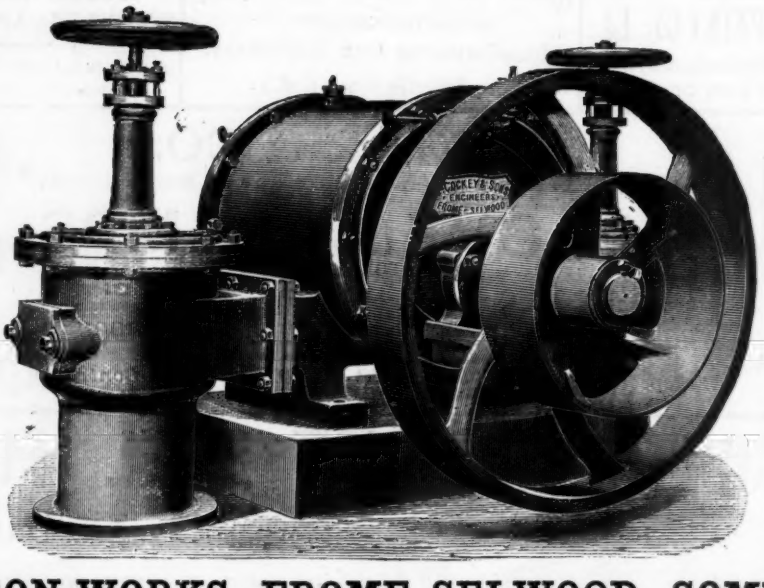
A Large Stock of Valves always on hand.

Lamp Columns; various patterns.

Wood Grids for Purifiers and Scrubbers.

Castings of every description.

Apparatus for the manufacture of Sulphate of Ammonia.



Experienced Retort-Setters constantly employed.

Lead Burning and Plumbing in all its Branches.

Gas-Fittings in great variety.

Brass Castings.

Patent Washers and Valves.

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THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

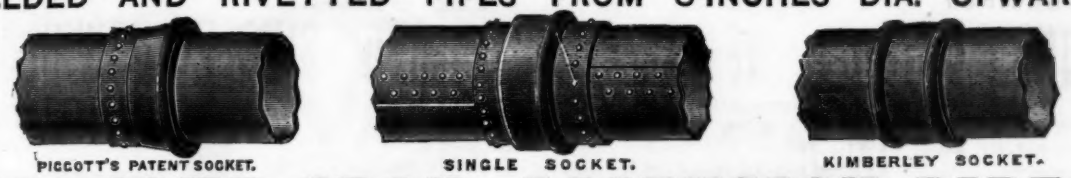
LONDON: 108, Southwark Street.

BIRMINGHAM: 114, Colmore Row.

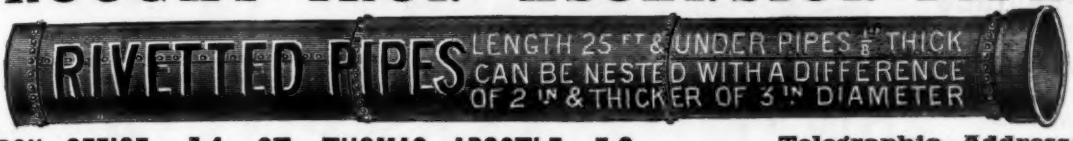
LEEDS: 6, Mark Lane, New Briggate.

THOS. PIGGOTT & CO., ATLAS WORKS, BIRMINGHAM.

WELDED AND RIVETTED PIPES FROM 8-INCHES DIA. UPWARDS.



WROUGHT-IRON ASCENSION-PIPES.



LONDON OFFICE: 14, ST. THOMAS APOSTLE, E.C.

Telegraphic Address: "ATLAS BIRMINGHAM."

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES, WITH RACK & PINION, OR Internal or External SCREWS, of all Sizes.

GASHOLDERS, AND Gasholder Tanks.

CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

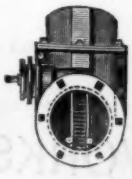
WROUGHT AND CAST IRON CONDENSERS, SCRUBBERS, & WASHERS,

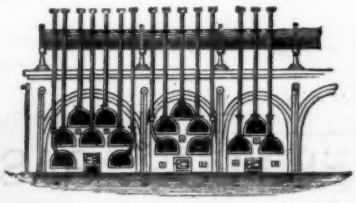
TAR AND LIQUOR PUMPS, &c.

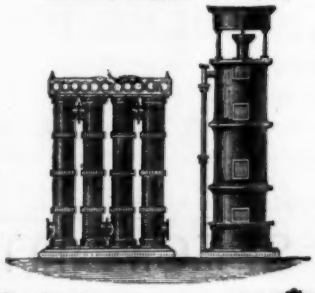
PATENT CENTRE VALVES

for working Purifiers.

Also Bye-Pass & Stop Valves.





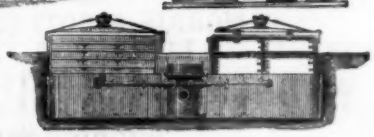


PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

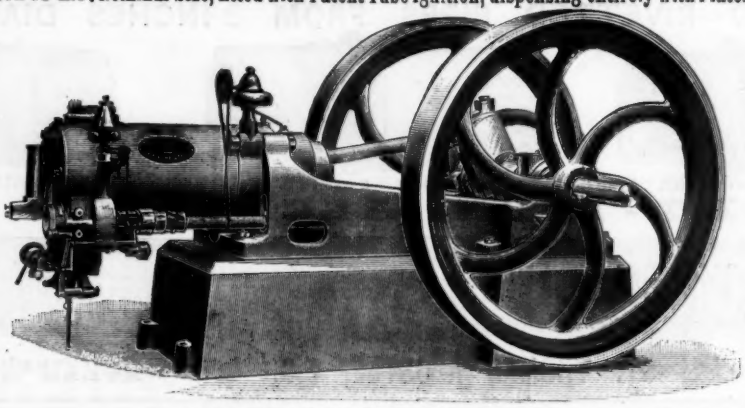
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES *2-Man to 100-HP.*

GAS-ENGINES COMBINED WITH **PUMPS** FOR TOWNS SUPPLY, SEWAGE, &c., &c.

GAS-ENGINES COMBINED WITH **AIR COMPRESSORS** FOR THE SHONE SEWAGE SYSTEM, LUCIGEN LIGHT, &c.

MADE in SIZES *2-Man to 100-HP.*

VERTICAL AND HORIZONTAL TYPES.

ENGINES *COMBINED* WITH HOISTS, PUMPS, DYNAMOS, &c., &c.

Largely used for EXHAUSTING, PUMPING, COKE CRUSHING, ELECTRIC LIGHTING, &c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

LONDON, LIVERPOOL, GLASGOW, NEWCASTLE, BIRMINGHAM, HULL.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND.

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

SAML. CUTLER & SONS, ENGINEERS.

ALL GASHOLDERS

Should be fitted with

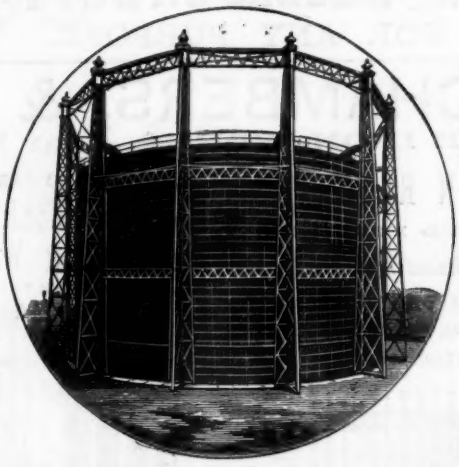
CUTLER'S PATENT FREEZING PREVENTER

Which has been

APPLIED MOST SUCCESSFULLY

At

LONDON GASLIGHT AND COKE COMPANY; IMPERIAL CONTINENTAL GAS ASSOCIATION; BROMLEY (KENT); YARMOUTH; HERTFORD; KING'S LYNN, &c., &c.



TESTIMONIALS.

Mr. WILLIS, of the Great Yarmouth Gas-Works, writes:

"We had a very sharp frost last night, which gave us a fair opportunity of testing the steam arrangement to Gasholder. You will be pleased to hear it was very effective; in fact, doing all we requ're."

Mr. Dow, King's Lynn, writes on Jan. 7, 1891:

"The apparatus you fixed to our Gasholder for preventing the water freezing in the cups has had a very good test the last few weeks' severe weather; and it gives me much pleasure to inform you that we have not had the least trouble with ice, and that it is a perfect success."

C. WOODALL, Esq., Palace Chambers, Westminster, writes on Jan. 10, 1891:

"I have fitted to several Gasholders your special apparatus for conveying steam to the cups, and preventing freezing; and it has proved satisfactory."

NEWBIGGING'S "HANDBOOK FOR GAS MANAGERS" (1889 edition, page 193) says:

"Messrs. S. Cutler & Sons have devised an apparatus for preventing freezing of the water in Gasholder Cups. The arrangement is self-acting, compact, and trustworthy."

CUTLER'S SPECIALITIES FOR GAS-WORKS:

MORRIS & CUTLER'S PATENT CONDENSER—The best obtainable.
LIVESEY & TANNER'S TAR AND LIQUOR OVERFLOWS.
CUTLER'S PATENT WATER-VALVES FOR PURIFIERS, &c.
EVERY REQUIREMENT FOR GAS-WORKS AND WATER-WORKS.

Offices: 16, GREAT GEORGE STREET, WESTMINSTER, S.W.
Works: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.
TELEGRAMS: "RETORTUS LONDON."

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS HUNSLET, LEEDS

LONDON OFFICE: 60, QUEEN VICTORIA STREET E.C.

CLAYTON SON & CO. LTD.

MAKE A SPECIALTY OF GASHOLDERS

AND MAKERS OF GAS PLANT OF EVERY DESCRIPTION.

REG^D TELEGRAPHIC ADDRESS: "GAS LEEDS"

THE WIGAN COAL & IRON CO., LIM^TD.,

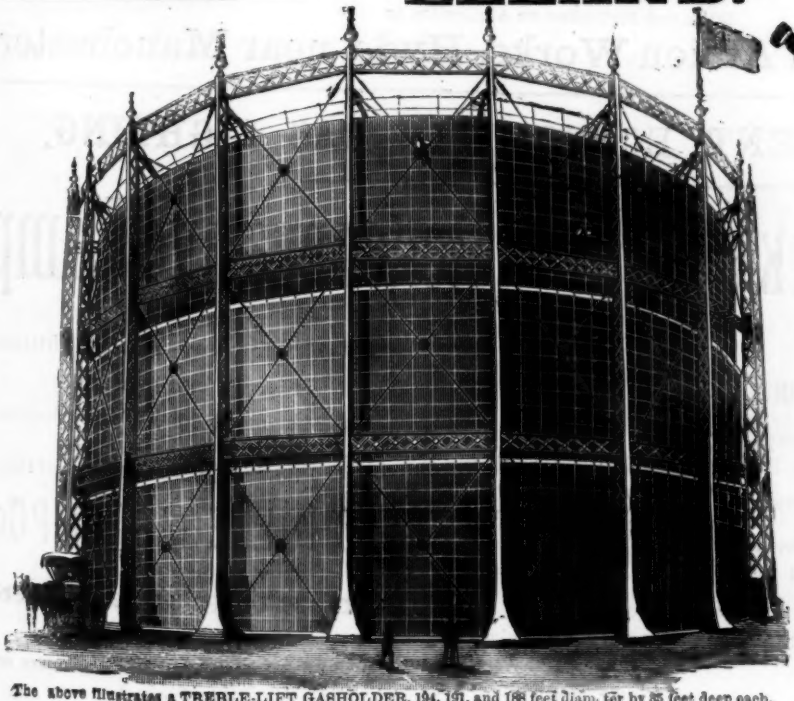
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.
TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.
LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.
TELEGRAPHIC ADDRESS: "PARKER LONDON."

R. DEMPSTER & SONS, Ltd.,

ROSE MOUNT GAS ENGINEERING WORKS,

ESTABLISHED — ELLAND. — 1855.



The above illustrates a TREBLE-LIFT GASHOLDER, 194, 191, and 188 feet diameter by 85 feet deep each, as made for the MELBOURNE GAS COMPANY.

GAS AND CHEMICAL PLANT OF EVERY DESCRIPTION — ALL SUNDRIES SUPPLIED.

OUR
ROTARY EXHAUSTERS
Are acknowledged to excel in efficiency and finish.

OUR IMPROVED
COKE-BREAKING MACHINE
Is a pronounced success.

Designs, Specifications, and Estimates submitted on application to

R. Dempster & Sons, Ltd.,
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JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
RETORTS CAREFULLY PACKED FOR SHIPMENT.
A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
C X C	"JACKSON"	BECK & Co.,
MARK.	CLAY CROSS.	130, GT. SUFFOLK ST., S.E.

SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

RUSCOE'S PATENT MACHINE

FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in., 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

Prices and Particulars on Application to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

SCHÜLKE GAS-LAMP Co.

LIMITED,

20, HIGH HOLBORN,

LONDON, W.C.,

Where Price Lists and full particulars may be obtained.

KIRKHAM, HULETT, & CHANDLER'S, LTD.,

[SIDNEY HERSEY, Managing Director.] **NEW PATENT** [J. CHANDLER, Engineer.]

"STANDARD" WASHER

EXTRACTS the WHOLE of the AMMONIA

Also a Large Proportion of H_2S and CO_2 from Gas.

Has been in operation over two years at the Beckton Station of The Gaslight and Coke Company. (See below.)

TESTIMONIAL FROM THE CHIEF ENGINEER OF THE GASLIGHT AND COKE COMPANY.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

MESSRS. KIRKHAM, HULETT, AND CHANDLER, LIMITED,

GENTLEMEN,—In reply to your enquiry respecting the result of putting "Wooden Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. TREWBY.

Order just received from the BIRMINGHAM Corporation for new patent "Bundles" for RENEWAL THROUGHOUT the 5,000,000 cubic feet per day "Standard" Washer erected in 1882.

For List of "Standard" Washer-Scrubbers supplied of above-mentioned pattern and renewals effected by application of same to old pattern machines, see last and next weeks' issue of the JOURNAL.

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

R. & J. DEMPSTER,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER,

MAKERS AND ERECTORS OF

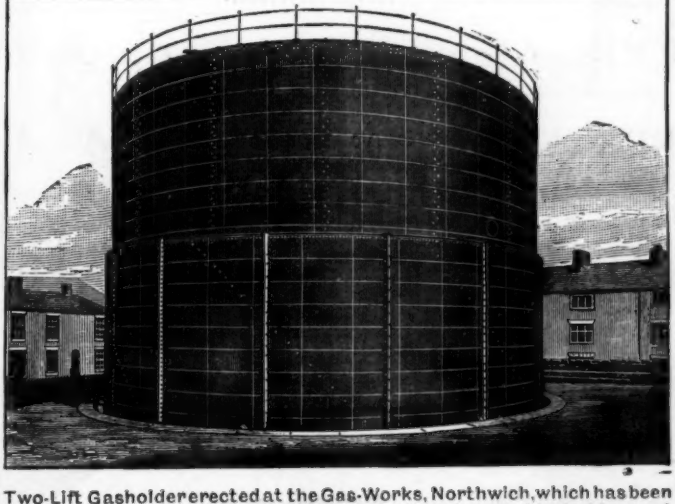
PATENT COLUMNLESS GASHOLDERS.

Telegraphic Address: "SCRUBBER MANCHESTER."

TOTAL WEIGHT REDUCED from 30 per cent. to 50 per cent.

TRANSPORT AND ERECTION REDUCED to the same extent; and in cases where gasholders are shipped abroad to places difficult of access, this represents a very large amount of money.

TANK CONSTRUCTION SIMPLIFIED. The Tank wall (of whatever construction) is a regular cylinder. There are no piers needed, and all expensive foundation stones for the base of columns or standards are dispensed with.



Two-Lift Gasholder erected at the Gas-Works, Northwich, which has been in continuous work since Jan. 3, 1890, and has been subjected to most severe tests from heavy gales, with perfectly satisfactory results.

COST OF PAINTING SAVED for the Columns and Girders.

TILTING UTTERLY IMPOSSIBLE; And as there are fewer parts, there is less liability for the Gasholder to get out of order in working.

STABILITY UNDER WIND PRESSURE of a Gasholder constructed upon this system is at least equal to, and from experiments and calculations made is far in excess of, that of a Holder of the same dimensions guided by the elaborate guide framing at present in use.

The removal of heavy guide carriages and rollers from the top curbs considerably lowers the centre of gravity of the structure, and dispenses with the extra strength of sheeting necessary to carry these at the points where they are attached to the gasholder.

The plan adapts itself to telescoping to any reasonable extent, and enables very shallow holders or lifts to be employed with perfect stability.

FOR FURTHER PARTICULARS AND ESTIMATES, APPLY TO THE ABOVE.

R. LAIDLAW & SON.

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions;

INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

MAKERS IN EDINBURGH OF

STATION METERS, ALL SIZES,
GOVERNORS,
PRESSURE REGISTERS
(To Indicate New Time),
PRESSURE GAUGES,
TEST GASHOLDERS,
TEST METERS,
SIEMENS' WATER-METER,
ALL KINDS OF GAS APPARATUS & FITTINGS.

MAKERS IN GLASGOW OF

CAST-IRON PIPES, ALL SIZES,
LAMP PILLARS,
STEAM-ENGINES,
PUMPING ENGINES FOR WATER-WORKS,
BEALE'S GAS EXHAUSTERS,
WROUGHT-IRON TUBES AND FITTINGS,
BEAMS, COLUMNS, TANKS, &c.

Wet and Dry Meters of every description repaired, altered, and adjusted, at prices which we shall be pleased to furnish on application.

A LARGE STOCK OF METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

Descriptive Price Lists, Estimates, & full particulars forwarded on application.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED,

CORNWALL WORKS, BIRMINGHAM.

DEPÔTS AT

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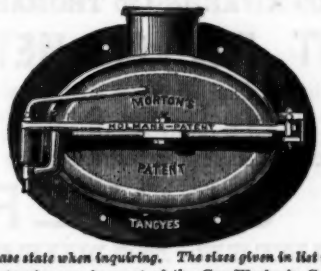
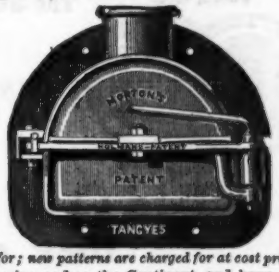
NEWCASTLE-ON-TYNE ST. NICHOLAS BUILDINGS
MANCHESTER . . . . . DEANSGATE
GLASGOW . . . . . ARGYLE STREET

Sole Makers of **MORTON'S** Patent Self-Sealing **RETORT-LIDS,**

With Anti-Friction CATCHES, and Self-Sustaining CROSS-BARS.





Price of Mouthpieces depends on number required, which please state when inquiring. The sizes given in list we have patterns for; new patterns are charged for at cost price.

These Patent Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, D, oval, and round (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 „	18½ „ 12 „	12½ „	0 19 0
6851	15 „	16 „ 14 „	13 „	1 0 0
3629	15 „	18½ „ 13½ „	14 „	1 0 0
3580	15 „	21 „ 15 „	15 „	1 0 0
6264	16 „	18½ „ 16½ „	15½ „	1 1 0
5210	16 „	20 „ 14 „	15 „	1 1 0
6263	16 „	24 „ 16 „	13½ „	1 1 0
5370	17 „	20 „ 14 „	14 „	1 3 0
6832	17 „	20 „ 14 „	17 „	1 3 0
6183	17 „	20 „ 15 „	15 „	1 3 0
4289	17 „	21 „ 15 „	14 „	1 3 0
5270	17 „	22 „ 14 „	14 „	1 3 0
3631	18 „	18 „ 14 „	20 „	1 5 0
3681	18 „	21 „ 14 „	18½ or 15 „	1 5 0
3554	18 „	21 „ 15 „	14½ „	1 5 0
7957	18 „	22 „ 16 „	14 „	1 5 0
8048*	19 „	25½ „ 15 „	18 „	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
9800	18 × 14½ ins.	18 × 14½ ins.	15 ins.	£1 5 0
9205	20 „ 12 „	24 „ 14 „	10½ „	1 10 0
10000	20½ „ 14½ „	20½ „ 14½ „	15 „	1 10 0
9680	21 „ 15 „	21 „ 15 „	15 „	1 12 0
10056	21 „ 14½ „	21 „ 14½ „	15½ „	1 12 0
13218	21 „ 15 „	21 „ 15 „	17 „	1 12 0
10514	22½ „ 13½ „	22½ „ 13½ „	13½ „	1 13 0
13766	20 „ 17 „	20 „ 17 „	15½ „	1 15 0
13269	24 „ 15 „	24 „ 15 „	18 „	1 18 0

190

Mouthpieces for Round Retorts.

Diam. .. .. ins.	14	15	16	17	18
Price, Lid and Fittings without Mouthpiece £	0 19 0	1 0 0	1 1 0	1 3 0	1 5 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 13 ins.	7 ins.	£0 19 0
3463	15 „	15 „ 13 „	14 „	1 0 0
6678	15 „	15 „ 14 „	12 „	1 0 0
3661	15½ „	15½ „ 13 „	12 „	1 1 0
13052	16 „	16 „ 13 „	13 „	1 1 0
5601	16 „	16 „ 14 „	15 „	1 1 0
6827	16 „	16 „ 14 „	17 „	1 1 0
4494	16 „	16 „ 14 „	14 „	1 1 0
3548	16 „	16 „ 15 „	12½ „	1 1 0
6677	16 „	16½ „ 13½ „	12½ „	1 1 0
9645	16 „	16½ „ 13½ „	12½ „	1 1 0
4434	16 „	17½ „ 14 „	14 „	1 1 0
6469	16 „	18 „ 14 „	15 „	1 1 0
9015	16 „	18 „ 14 „	18½ „	1 1 0
4327	16 „	18 „ 15 „	15½ „	1 1 0
8049*	16 „	18 „ 15 „	17½ „	1 1 0
6137	16 „	20½ „ 18½ „	18½ „	1 1 0
5918	17 „	18 „ 14 „	14 or 17 „	1 3 0
5053	17 „	19½ „ 12 „	14½ „	1 3 0
7548	17 „	20 „ 13 „	15 „	1 3 0
6468	17 „	20 „ 16 „	15½ „	1 3 0
4316B	17 „	21 „ 14 „	14 „	1 3 0
7975	17 „	21 „ 15 „	14½ „	1 3 0
13459	17 „	21½ „ 18½ „	15 „	1 3 0
12990	18 „	18 „ 15 „	15 or 19 „	1 5 0
7135	18 „	18½ „ 15 „	13 „	1 5 0
10221	18 „	18 „ 16 „	12½ „	1 5 0
4506	18 „	20 „ 13 „	19½ „	1 5 0
6470	18 „	20 „ 18 „	15 „	1 5 0
6818	18 „	20 „ 18½ „	17½ „	1 5 0
4063	18 „	20 „ 15 „	16 „	1 5 0
5306	18 „	20½ „ 14 „	13½ „	1 5 0
13295	18 „	20½ „ 14 „	19½ „	1 5 0
7356	18 „	20½ „ 18½ „	18 „	1 5 0
4569	18 „	21 „ 14 „	18 „	1 5 0
3628	18 „	21 „ 15 „	16 „	1 5 0
7640	18 „	22 „ 19½ „	12½ „	1 5 0
7971*	20 „	20 „ 15 „	18 „	1 11 0

*Patterns marked * have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.* 191

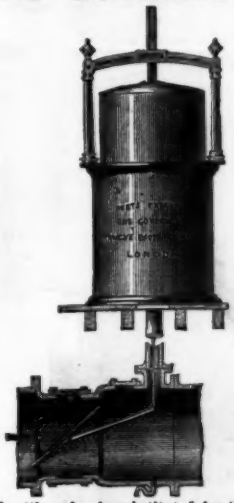
Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimension of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	13 ins.	£1 2 0
9967	16 „ 14 „	16 „ 14 „	15½ „	1 3 0
13574	16½ „ 13½ „	16½ „ 13½ „	13½ „	1 4 0
9899	18 „ 13 „	18 „ 13 „	14 „	1 4 0
12980	18 „ 16 „	18 „ 16 „	18 „	1 6 0
13900	18 „ 13½ „	18 „ 13 „	15 „	1 6 0
9912	18 „ 13½ „	18 „ 13½ „	17 „	1 6 0
9962	18 „ 13½ „	18 „ 13½ „	16 „	1 6 0
10982	18 „ 13½ „	18 „ 14 „	15 „	1 6 0
11098	18 „ 14 „	18 „ 14 „	13 „	1 6 0
9492	20 „ 13 „	20 „ 13 „	15 „	1 10 0
9208	20 „ 13 „	20 „ 13 „	19½ „	1 10 0
10251	20 „ 13 „	20 „ 13 „	15½ „	1 10 0
12964	20 „ 13 „	20 „ 13 „	13½ „	1 10 0
9909	20 „ 13½ „	20 „ 13½ „	17 „	1 10 0
12969	19½ „ 15½ „	19½ „ 15½ „	14 „	1 11 0
13781	20 „ 15 „ Front.	21 „ 15 „	15 „	1 11 0
	21 „ 15 „ Back.			
7692	21 „ 15½ „	21 „ 15½ „	16 „	1 11 0
12978	20 „ 16 „	20 „ 16 „	17 „	1 11 0
13252	20 „ 16 „	20 „ 16 „	18 „	1 11 0
13220	21 „ 15 „	21 „ 15 „	17 „	1 11 0
8977	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 11 0
8976	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 12 0
10497	21½ „ 13½ „	21 „ 13½ „	18½ „	1 12 0
8037	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 12 0
9908	21½ „ 13½ „	21½ „ 13½ „	15 „	1 12 0
10404	21½ „ 13½ „	22 „ 14 „	18½ „	1 12 0
12410	21½ „ 13½ „	22 „ 14 „	13 „	1 12 0
13822	21½ „ 13½ „	22 „ 14 „	15 „	1 12 0
10515	22½ „ 13½ „	22½ „ 13½ „	13½ „	1 12 0
7924	24 „ 14 „	24 „ 14 „	15½ „	1 13 0
13807	24 „ 15½ „	24 „ 15½ „	16 „	1 14 0
9015B	25 „ 14 „	25 „ 14 „	12½ „	1 14 0
10932	25 „ 14 „	24 „ 14 „	18½ „	1 15 0
12944B	22 „ 16 „	22 „ 16 „	16 „	1 15 0

Patterns marked B have curved bottoms. 192

HUNT'S PATENT EQUILIBRIUM DIRECT MAIN

GAS GOVERNOR.



In this Governor a throttle valve is substituted for the ordinary suspended cone; all external communication being avoided by placing the lever or radius arm inside the valve chamber upon the disc.

The disc is carried upon steel centres, upon which it is accurately balanced.

4 ins. ..	£17 0	8 ins. ..	£25 0	14 ins. ..	£42 0	20 ins. ..	£60 0
5 „ ..	20 0	10 „ ..	33 0	16 „ ..	46 0	24 „ ..	72 0
6 „ ..	22 10	12 „ ..	38 0	18 „ ..	50 0	36 „ ..	130 0

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4th—Cannot become fixed by Frost, however severe.
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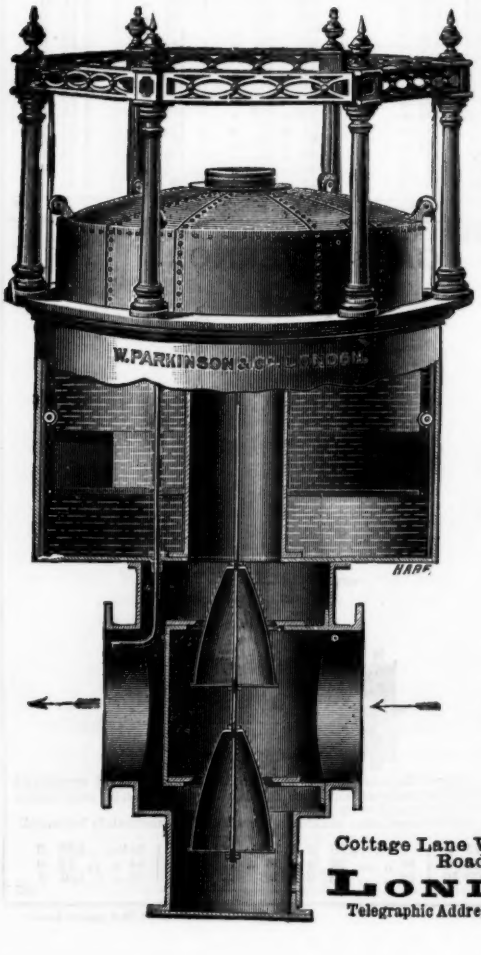
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.



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A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

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TO ADVERTISERS.

ADVERTISEMENTS for the next number of the JOURNAL must be received by Monday, 12 o'clock noon, to ensure insertion; but **Orders for Alterations in or Stoppages of PERMANENT ADVERTISEMENTS should be received Not Later than the FIRST POST on SATURDAY.**

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 3, 1891.

Leeds and Labour.

AFTER what was reported in last week's JOURNAL, it will surprise nobody to learn that the Leeds stokers have once more exacted what they wanted from the Corporation Gas Committee. There can be no questioning the fact that the men have throughout this affair displayed infinitely greater capacity in the management of their business than their employers; and if success in gaining one's end is the test of right as well as of skill, then the Leeds stokers have a claim to public respect which is not likely to be entertained with regard to Mr. Alderman Gilston and his incapable Committee. We published last week a letter from Mr. George Livesey upon this affair, which disagreed with the view we had taken of the central point in the dispute. This, it may be as well to repeat, was the customary manner of reducing gas-works hands for the summer, when the last to be taken on are the first to go, and so on until the permanent working staff is reached. Acting under the instructions of his Committee—who, it may be observed, have not had the candour to acknowledge this fact, but have left him to bear the reproach of it all—Mr. Smith, the Manager of the New Wortley station, chose to ignore the custom, and wished to make a clean sweep of sixty-six old and new hands together, upon the pretence that the stack which they were working was to be let down. Thereupon the men and their Union rose up in arms, and wanted to know why the old custom had been abrogated. Then the Gas Committee began to shuffle. If they could have done so, they would have denied the existence of the custom referred to by the men; but neither Alderman Gilston nor anybody else on his side dared even to discuss the custom. All they tried to argue for was that, as nothing was said about any such custom when the strike was settled and the men engaged upon 28 days' notices, so long as they gave the notices in a regular way the men concerned could have no further claim upon them, whether customary or otherwise. The men, of course, very soon knocked this bit of "canny" sophistry into space. Nothing was said by them about the custom at the time of the settlement, simply because they had no thought of bringing it into question. When their attention was called to the fact, however, by the recent action of the Gas Committee, they promptly put the matter to the issue by simultaneously sending in their notices. Mr. Livesey argues that the view of the Committee as to the abrogation of all old customs by the new arrangement is justifiable. Perhaps it is. The question is an academic one, for in the case of Leeds the Committee only meant to "try it on." We foresaw that they would run from their position, whether good or bad, as soon as it was attacked; and this is precisely what they have done. They might have fought the Union upon the point, as well as on many others, if they had had any backbone. But they are as flabby as a jelly-fish; and while the world is constituted as it is, nobody is likely to trouble much about the principles and opinions of such invertebrates.

Again, Alderman Gilston has supplied his critics with ample evidence of his utter incapacity to manage the Leeds Gas-Works in anything like a sensible manner. In his speech, reported in another column, he shirks the issue of the breach of custom, and reverts to what he told the men before about the Works Managers having had ample reason, in the men's own misconduct, for dismissing them if the Committee had wished to be "vindictive." This is the most hopeless foolishness, coming from the Chairman of a Gas Committee. If men lose time, get drunk, or otherwise deserve dismissal, they ought to be discharged; and, as the Secretary of the local Union branch reminded the Alderman, the Society has never defended men guilty of such misconduct. If any Leeds stokers have so acted, and have not been properly punished, the fact is not at all evidence of the absence of "vindictiveness" on the part of the management, as Alderman Gilston seems to think, but rather of its general looseness and inefficiency. The Union dare not defy an employer in defence of a hopelessly bad workman; and to adduce softness to such as an argument in favour of the existence of friendliness to their Union is a piece of folly that would be incredible if Alderman Gilston had not actually taken credit for it. His worst enemy could do him no greater unkindness than to allow him the claim.

We have dealt at length with this fresh Leeds surrender because it is such a splendid example of how gas-works ought not to be managed. Happily, there are probably not half-a-dozen other gas undertakings in the United Kingdom where the administration is so hopelessly bad as it is in Leeds; so that the mischief is not likely to spread. We say that this is a happy circumstance; and so it is, for the workmen as well as for others. They must see

from this case that when their employers are so weak-kneed that they can knock them down whenever they choose, there may at any time be attempts at underhanded reprisals on the part of the vanquished. There can be no true peace between such as the Leeds Gas Committee and their workmen; at best there can only be armed truce—both sides suspecting treachery, if not plotting to practise it. The best course to follow at Leeds now would be to constitute an Arbitration Board, which should decide upon all questions of work and employment. With regard to the renewed strength which this latest triumph may be supposed to bring to the Gas Workers' Union, the managers of this organization may be recommended to make the best of it, as some compensation for their failures elsewhere. The Assistant General Secretary of the Gas Workers' Union (Mr. Ward) has sent us a wild letter in reply to Mr. Livesey's remarks of last week. The quaint confusion of ideas revealed in this epistle, as to who was really responsible for the South Metropolitan strike, its ignoring the accusation that submission to the rule of the Union has, in at least one case, forced wages up 40 per cent., not 25 per cent., and its admission that violence alone won the Leeds strike, may, we fear, be taken as indicative of the "little wisdom" that has hitherto prevailed in the counsels of the society that pays Messrs. Ward and Thorne to look after its interests. As there is not the least likelihood that any of the gentlemen he has named will reply to his remarks concerning them, we will remind Mr. Ward of what he very well knows to be the fact—that the so-called "blacklegs" whom he describes as having been supplied to Leeds and elsewhere by the South Metropolitan Engineers, were the strikers whom he and his fellows had deluded to their ruin, and who returned, bewailing their folly, to implore their old masters to find work for them when their strike leaders had abandoned them to starve. The best comment upon the remarks as to the Union securing better conditions for workmen than Mr. Livesey was willing to bestow, is the state of the successors, in the South Metropolitan service, of the dupes of the Union officials. Mr. Ward can hardly believe that even gas workers are such fools as not to see that the South Metropolitan strike was a terrible mistake, and that the benefits which the new staff are enjoying would have been the property of the old hands if they had not paid their twopences to be led astray by rash advice.

Leaving this matter, it is worthy of remark that there appears to be once more a split in the camp of those who exploit the "Sacred Cause of Labour." It was reported a few days ago that a body of representatives of the New Unionism had approached Mr. Parnell with a view to the conclusion of some mutually advantageous political compact. The reply to this proceeding was the appearance in Mr. Michael Davitt's *Labour World* last week of an editorial declaration to the effect that there has been enough striking for the time being, and that the various labour organizations whose strikes, and incitements to strike, have for months past been "frequent, and painful, "and free," should give that policy a rest. This means, of course, that the "Sacred Cause of Labour" is being once more dragged at the tail of a political procession which has the platform for its starting-point and "place" for its goal. With its membership committed to shout either for Parnell or Davitt as the leaders dictate, it does not seem likely that the party of New Unionism will have much force in British politics. On the other hand, it is a further illustration of the "little wisdom" of the Unionist leaders generally, that they contemplate mixing themselves up with Irish Nationalist politics just when the bulk of English and Scottish voters are deciding to let the Irishmen settle their differences among themselves.

The Meeting of the Manchester District Institution.

THE members of the Manchester District Institution of Gas Engineers met on Saturday in the city from which their organization takes its title, under the presidency of Mr. T. O. Paterson, of Birkenhead, who pronounced in the course of the proceedings the Inaugural Address which we reproduce in another column. It is a composition of a sound practical character, containing many valuable hints for gas managers, drawn from the speaker's observation and experience. Situated as he is, Mr. Paterson's opinions respecting the probability of a continuance of dear coal, and especially cannel, must be regarded as authoritative. According to these statements, the sooner gas managers of the North of England see about carburetting with oil or spirit, the better. Mr. Paterson is dissatisfied, and not without reason, with the existing condition of the coal tar trade; and throws out a suggestion for remedying it in his own locality, which has at least the virtue of novelty. It is, that a sufficient number of gas undertakings should "pool" their tar; having it worked up in plant of their own providing, and selling the products for what they will fetch. No doubt something should be done to put the tar trade in a better state; and Mr. Paterson's suggestion is at least more reasonable than that all gas-works should work up their own tar. The address contains some useful data relating to the popularization of gas cooking-stoves and fires. The meeting was very well attended and most successful; and there was a good company at the subsequent "coming-of-age" dinner of the Institution.

Dinsmore Experiences.

WHEN, a fortnight ago, we referred in these columns to the Liverpool experiment of the Dinsmore Company, we hardly expected that our statement, which merely dotted the i's and crossed the t's of the reference to the same matter in the last report of the Directors of the Company, would have drawn out the letters that appeared in our last issue. It seems that our remarks offended the Company, besides grieving Mr. Dinsmore and enraging Mr. Isaac Carr. So we succeeded in being disagreeable all round, without consciously taking any pains to secure such a result. These various letters read very oddly, one after the other; but it will be better to leave them to tell their own story, with the single exception of the letter of the Dinsmore Company, which came to hand so late that we could not do anything else than insert it as it stood, or perpetrate the apparent injustice of holding it over for another week. It would, perhaps, be judging with harsh judgment to call this delay intentional; but it is certainly strange that an official communication in reply to something which we published on the 17th could not be handed in to us before late on the 23rd. However, we have no desire to exalt this circumstance into undue prominence, and only mention it with other Dinsmore matters in order to assure our correspondents, if they need the assurance, that we have not the slightest desire to show aught but the fairest of play to anybody interested in the matters that find mention in the JOURNAL, whether as news or as editorial comments. We might upon the present occasion ask the Secretary of the Dinsmore Company if he is *quite* sure that all the necessary points in the history of this scheme were mentioned in the first paragraph of his last week's letter. We might set Dinsmore to refute Carr, or *vice versâ;* but we shall content ourselves with pointing out, once and for all, that the justification for our editorial remarks of the 17th ult. was the reference in the report of the Directors of the Dinsmore Company, which we referred to as a subject of legitimate public interest. It is that reference to which our correspondents ought to take exception. We only made it prominent. If we erred in any respect, it was in assuming that the experiment undertaken by the Dinsmore Company in Liverpool was with the Dinsmore process. It does not seem a particularly heinous crime, however, to speak of the Dinsmore Company as though they knew what their process was when they undertook to demonstrate its success in Liverpool. Their example should be a warning to other experimentalists to make sure with what horse they mean to win before they start.

Natural Gas.

THE subject of the natural gas supply of a considerable region of the States of Pennsylvania and Ohio is one of the most interesting of American questions in the estimation of a gas engineer. We have frequently discussed it in these columns, and have speculated as to the influence which this wonderful supply of natural gaseous fuel may be supposed to exert upon the popular appreciation of artificial fuel and lighting gas in cities of the United States where the Ohio and Pennsylvania product is not available. From the facts that have come under our notice, we have formed the opinion that natural gas is not only likely to become exhausted at no distant date, but also that by far the greater part of it is either wasted or most extravagantly used. According to a statement ascribed to Professor Edward Orton, of the Ohio Geological Survey, these conclusions are amply justified. He declares that natural gas has to do the very important

work of preparing the world for something very much better than itself. It is giving an object-lesson to great communities respecting the advantages of gaseous fuel, which is surely a lesson that can hardly be given in vain. "The exemption from the soot and dust inseparable from "the burning of bituminous coal in our cities, and the "positive addition that gaseous fuel makes to the comfort "and convenience of the entire community when used "as a domestic fuel and as a source of steam power, are "results in themselves too valuable to be abandoned "when these small and treacherous stocks of buried power "are exhausted. The conversion of the coal now burnt "in a large city into gas before being used, would "result in an immense economy in fuel, besides "affording the incidental advantages alluded to above; "and this economy of stored power is an object to which "the civilized world will soon be obliged to address itself "in good earnest." This observation is pretty much what every thoughful man has in mind with regard to the progressive exhaustion of the world's accumulated coal capital; but it comes with peculiar force from one who sees daily the results of the general use of gaseous fuel. Professor Orton lays great stress upon the advantages of gaseous fuel—which in his own locality means natural gas—for domestic purposes. To preserve the natural supply for the longest period for these purposes is, in his judgment, the highest public interest in connection with it. The poorest members of the community are, in his opinion, most entitled to be supplied at the lowest possible rate of charge; and if a sliding scale of prices is introduced, he thinks it ought to slide contrary to the usual way, so as to make large consumptions dearer than small. With this view, Professor Orton would forbid the use of natural gas altogether for iron-works, brick and lime burning, and similar manufacturing operations which require much fuel, but which have hitherto been supplied at wholesale rates that offered no inducement to economize. The idea that a large demand for natural gas ought to be met with a higher price than is charged to small consumers seems at first sight paradoxical; but if the supply is to be treated as liable to exhaustion, it is logical. The most interesting point in Professor Orton's remarks upon the general subject, however, is his argument that natural gas, even where it is most plentiful, is to be regarded as introductory to the popularization of a more permanent kind of gaseous fuel.

The Quality of American Local Administration.

It is not new for the JOURNAL to be accused of making objectionable comments upon persons and things. We do it habitually, in the estimation of some people; and especially our incurable lack of appreciation of some great American institutions gives, we are told, great offence on "the other side." At least, we should seriously annoy many highly respectable American gentlemen, mainly connected with certain water-gas concerns, if our ignorance of everything and everybody concerned in the noble American interest of gas "piracy" were not too dense to deprive of the smallest value anything we publish on this recondite subject. This being understood, it is with much diffidence that we venture to refer to a curious paragraph in a recent issue of the American *Engineering Record*, as supplying very interesting evidence in support of the general contention which has been maintained before now in these columns, that the art of gas management in the United States, like the "Heathen Chinee," is "peculiar." We have had the temerity to state the opinion that the chief cares of the ablest gas managers throughout the States are precisely those which they are careful to say nothing about when they read papers or pronounce inaugural addresses in the presence of reporters; and that a certain predilection for talking airily about subjects of the Fourth of July order, or discussing with effusion very small technical matters, which these gentlemen display when they meet in conclave, may be referred to the fact that they cannot conveniently discuss the topics on which their interest is closest. Well, of course we know nothing about the matter; but people on the spot are probably better informed, and what they say is very instructive. They have a general idea that "corporations [*i.e.*, companies] are in the habit of "using improper means with legislators to promote or "protect their interests"—which is a very euphemistic way of putting it. In support of this belief, a certain senator is cited by name as authority for the statement that, when President of the Common Council of his town, he was requested on behalf of the local Gas Company to remove two names from the Street Lighting Committee, and replace them with two others. He refused; and ever since he has had the determined opposition of the gas interest. But the Gas Company were not the only sinners. The city was paying $240 each for electric arc lamps burning until midnight. A Committee ascertained that the city could light its own streets for $60 per arc lamp, burning all night, and that the necessary plant would not cost more than $35,000 at the outside. "The "matter came before the City Council, and it was be- "lieved that this body would vote to establish a plant. "About that time there was a noticeable absence of "members from the City Council meetings. One member "of the Common Council was hired by the electric light "company to go to Canada to sell burners. He was gone "three weeks, sold no burners, had none sent him; but "he had his salary and expenses paid regularly." No wonder any sort of artificial lighting is very dear in the States, if these are the kind of working expenses that have to be provided for. It must be admitted that the idea of deporting the members of a whole City Council, in order to stave off a hostile vote, is Napoleonic. We never suspected gas "pirates" of anything half so brilliant. Electricians, of course, are more scientific and advanced in their business methods. All the same, there must be plenty of scope for a genius in gas administration where local authorities are so approachable, so thoroughly open to conviction, as those of the United States.

Miss Agnes Kelman gave a series of demonstrations in cooking by gas last week, in the new premises of Messrs. T. Fletcher and Co., in Cheapside, recently described in the JOURNAL.

A Large Gasholder.—The Directors of the South Metropolitan Gas Company, as will be seen from our advertisement columns, are applying for tenders for a six-lift gasholder. Each lift is to be 30 feet deep; and the diameter of the outer one 300 feet. The capacity of the holder is to be about 12 million cubic feet.

Presentation to Mr. J. M. Frith.—Last Tuesday the employees at the Aldershot Gas-Works presented Mr. J. Mason Frith with a silver-mounted walking-stick, as a slight token of their esteem for him, on his resignation of the position of Superintendent of the works, as announced in the JOURNAL last week. The presentation was made by Mr. Woods, the foreman; and, in acknowledging the gift, Mr. Frith said he should always be pleased to reflect that he had left Aldershot with the best wishes of those with whom he had worked.

Midland Association of Gas Managers.—The fourteenth annual meeting of this Association is to be held at the Great Western Hotel, Birmingham, next Thursday, under the presidency of Mr. C. Stafford Ellery, of Bath. The business will consist of the presentation of the report and accounts for the past year, the delivery of the Inaugural Address, and the discussion of the paper read by Mr. J. T. Lewis, of Wellingborough, at the last meeting, on "Weekly and Monthly Payments for Gas."

Jubilee of the Chemical Society.—Last Tuesday afternoon, a meeting in celebration of the Jubilee of the Chemical Society took place at Burlington House, Piccadilly. Dr. Russell, the President of the Society, was in the chair. Among those present were many distinguished chemists whose names are familiar to our readers—Sir H. Roscoe, Sir W. Grove, Sir F. A. Abel, Professor Frankland, Professor Odling, Mr. Crookes, Sir Lyon Playfair, M.P., Professor Dewar, Professor Meldola, and Dr. Armstrong. The President, in opening the proceedings, said the Chemical Society boasted that it held the distinguished position of being the first which was formed solely for the study of chemistry. The official record stated that on Feb. 25, 1841, 25 gentlemen interested in the prosecution of chemistry assembled at the rooms of the Society of Arts to consider the expediency of forming a Chemical Society. Of the 25 who then met, he was happy to say three were present that day—Sir W. Grove, Sir Lyon Playfair, and Mr. Heisch. The Society when originally founded numbered 77 members. The first meeting to consider the foundation of the Society was brought about by the late Mr. Robert Warington; so that to him they were indebted for its existence. The President attributed to Liebig the cause of the great enthusiasm manifested in the past half century in scientific investigations; and the Chemical Society afforded students a ready means of publishing their discoveries, and provided them with a meeting place for discussion and the interchange of ideas. Sir Lyon Playfair and Sir W. Grove then delivered short addresses dealing with the position of chemistry at the time of the foundation of the Society; and with some of the more distinguished chemists of that day. Professor Odling discoursed on the development of chemical theory since that time—tracing the causes of the rapid progress of chemistry, and enumerating the principles the discovery of which has chiefly contributed to recent advances in chemical science.

WATER AND SANITARY AFFAIRS.

MEETINGS are rife on the Metropolitan Water Question; and more are promised. One of these gatherings took place last Friday, under the presidency of Sir Algernon Borthwick, M.P. The meeting was ostensibly called "for "the purpose of diffusing information only;" and no resolution with reference to any of the Bills now before Parliament relative to the London Water Supply was to be entertained. Nevertheless, the advertisement calling the meeting was headed by the words "Metropolis "Water Supply Bill;" and it was by the Chairman that this Bill was brought into Parliament. Under these circumstances, it was somewhat significant that the meeting was held in the hall of the London County Council in Spring Gardens; the notice convening the meeting being signed by Mr. Harry Wilkins, the Honorary Secretary of the Executive Committee of Vestries and District Boards. The Chairman's speech, as might be expected, was in support of the Bill with which he is identified; and the discussion which followed was directed to the same topic —the result being a resolution, unanimously adopted, declaring it desirable "that the water supply of London "should be vested in a public representative authority "with the least possible delay." According to the Bill, this authority may take the shape of a Water Trust, or it may be wholly centered in the London County Council. As explained by Mr. Harry Wilkins and others, whether this authority is to be the Council or a Trust is a question to be decided by Parliament. Of course, this is assuming that there is a need for one or the other, and that the Companies are to disappear entirely from the scene. Sir A. Borthwick pointed out to the meeting that "the "Bill which they were asked in general terms to approve" provided for the purchase of the undertakings of the Water Companies. He advocated this purchase on two grounds—one being that the present supply was a good one, as proved by the satisfactory state of the public health in London. The second reason for purchase was that a competing supply was impracticable. The present supply would doubtless have to be supplemented by another; and the Bill provided for this by obtaining water from Leatherhead and Rickmansworth. In reply to the Chairman, one of the parties present expressed an opinion that there was nothing in the Bill likely to produce a reduction in the water-rate. Mr. Mark Judge, though seconding the resolution in favour of a public representative authority, did not think that the work should be confided to the London County Council; that body having already quite enough to do. Sir William Farrer, on the contrary, thought the County Council was the proper authority to carry on the water supply. Reviewing the proceedings at this meeting, we may observe that the best part of the affair seems to have been the Chairman's speech, in the course of which the wild notion of a competing supply was ably criticized. Among other objections to such a plan, Sir Algernon asked: "How could they have two mains laid "on for every house to choose from, with each underselling "the other?" But there was the still more fatal objection, relative to the laying of a second 4000 miles of pipes, and the consequent breaking up of the streets.

The daily press appears to be of opinion that the meeting at the County Hall has done very little to advance the water question. Still, the gathering was not without importance, as showing the views entertained by the numerous local representatives present on the occasion. These know pretty well what is meant by a "competing supply," and they also have an idea as to the necessary limit to the working power of the County Council. But the daily papers attach more especial value to the meetings which are being convened by the London Liberal and Radical Union, "to protest against the increase of the London "water-rates under the quinquennial valuation." Approval is thus given to Mr. Causton's Metropolitan Water Companies' Charges Bill, which is to prevent a rise in the charge for water as a consequence of an increase in the rateable value of property. The Companies are not to be at liberty to charge more for the supply, unless—as one reason—they can show that the cost to them in providing that supply has increased. We would observe that the economic basis of this regulation seems rather defective. If the Companies choose to be extravagant, they can charge more; if they administer their affairs economically, they must stick to one sum by way of charge upon the consumer. No doubt there has been a rise in rateable value of £1,500,000 under the new valuation, taking the Metropolis all through. This is the aggregate result; but there are cases in which property has declined in value. The supply costs the Companies quite as much as it did before; but where the rateable value falls, they are not empowered to maintain their charge at the former level. On the whole, we are not sure that the fate of Mr. Causton's Bill is of much consequence to the Water Companies. They are not accustomed to charge up to the hilt in all cases; and there is a considerable amount of property, figuring largely in the valuation lists, which pays nothing at all for water. Alarming calculations are made as to the increased price which the Companies will ask for their undertakings, in consequence of the enlarged revenue which they will obtain under the new quinquennial valuation. But a patient examination of particulars will in all probability show that there is little reason for the economists to be apprehensive on this point. The *Evening Standard* has declared that the signs of the times are unfavourable to vested interests of any sort, and "the Water Companies have absolutely "no friends." This is melancholy, but in some measure true. Yet if other "vested interests" will wake up and make common cause with the Companies, friends will be found. The paper just quoted advises the Companies to "take what they can get," and to agree with their adversaries quickly. This may be good advice; but the transfer of the London water undertakings is a big business to settle off-hand.

The manner in which the House of Commons, during the debate on the London Water Commission Bill, discussed the propriety of handing over the Metropolitan Water Supply to the London County Council, was certainly calculated to excite the apprehensions of the Local Authorities and inhabitants of the outer area. Mr. Ritchie on the side of the Government, and Sir William Harcourt as a prominent member of the Opposition, both contemplated the transfer of the supply to the County Council as a sort of inevitable result. Mr. Ritchie so far recognized the rights of the outer area as to suggest that there might be some kind of connecting-link established between the Council and the outside authorities. But not one of the speakers in the course of the debate can be said to have put the question of the outer area in anything like a distinct and positive form. On the contrary, there were those who argued against any representation being allowed to the outer area. This was urged on financial grounds, and also because the interests of the inner and outer portions were supposed to be distinct. The latter reason might have been thought to furnish proof why the outer area should be allowed a share in the government of the water supply. But there seemed to be a general abandonment of the principle that taxation and representation should go together. The London County Council was looked upon as being a grand exception to all ordinary considerations, and thoroughly qualified to rule over the water consumers of a region comprehending an area of 400 square miles, including a population equal to that of Liverpool and Manchester put together, without these people or their authorities having any share whatever in the disposal of their interests. The outer area surrounding London is that part where the population increases most rapidly, and where the growing demand for water more especially arises. It is to be hoped that these points will receive due attention from the House of Commons when the Metropolis Water Supply Bill comes on for its second reading (fixed for to-morrow). As regards the further action of the County Council, we may look for the preparation of a scheme to bring in a distant supply, after the manner indicated in Mr. Binnie's report; and in the meantime the Council may initiate a Bill giving them power to introduce in the future such Water Bills as they think proper. A new phase of the outer area difficulty presents itself, in the shape of a very decided movement on the part of the Berkshire and Oxfordshire County Councils. These authorities are anxious to be heard before the Select Committee in defence of the sources of water supply as affected by the London Water Commission Bill. A petition is to be presented to Parliament, praying that County Councils may be allowed a *locus standi*. Lord Wantage denounces the Commission Bill as apparently designed to coerce the Water Companies "by terrifying them with a design to "tap the Berkshire downs."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 413.)

THE week just closed exhibits on the whole an improvement. It opened flat enough, and the "bears" had decidedly the upper hand. A better feeling, however, soon set in; and although the markets were not without some subsequent fluctuations, the tendency on the whole was in the right direction. A satisfactory settlement also ended in restoring cheerfulness. There have been no great and sudden advances made; and it is better so. The slow and steady strengthening of a market is far better than galvanic jumps, with their inevitable reaction. Great hopefulness was inspired as to an adjustment of the Argentine financial difficulty, which we cannot altogether share. Care must be exercised not to indulge yet in too sanguine a view, the disappointment of which may deal a hard and widespreading blow. The Money Market is a shade firmer; but there is ample for all requirements. The Gas Market keeps up its level rate of activity, and stocks of all descriptions rule quite firm. With the exception of the South American undertakings (temporarily affected by local troubles), all movements of price are for the higher. Gaslights of all sorts have been dealt in. The "A" continues to creep up steadily, and has gained 2 more in the week, changing hands more than once at 243. The debenture and preference issues have been unusually brisk, and stand in good favour generally; though the only one to advance was "J," which improved 1. Why cannot this stock be grouped with the "C," "D," and "E"? For all practical purposes they are of equal value; and nothing intervenes between them except two small and lightly-charged issues, amounting in all to only £90,000. There are other issues of other Companies which are quoted as one, and which are good delivery the one for the other, although their relative values in point of ranking are far more widely apart than are the "E" and the "J" of The Gaslight and Coke. South Metropolitans have hardly been touched; there being very little stock on offer apparently. On *ex div.* adjustment, quotations show out rather higher. Nothing has changed hands in Commercials except the debenture, which is up 3. Suburbans and Provincials have not been dealt in; but Brentfords command a better price. Of the Foreign undertakings, there is little to report. A few transactions in Imperial Continental culminated in an advance of 1, with business effected at 229—a good figure. The rest do not offer any conspicuous feature. Water was pretty active and firm the early part of the week, when advances were effected by Kent and Lambeth. But the tide turned later on; and East London receded.

The daily operations were: Gas opened firm on Monday, and held on through the day, though business was limited. Quotations stood up well, though not advancing. Water was in good odour; and Kent rose 2, and Lambeth, 1¼. Business in Gas on Tuesday was mainly in Gaslight issues; the "A" advancing 2, and the rest being steady. On Wednesday there was no change in Gas; but everything dealt in marked a fair price. Water was not at its best. Gas remained unchanged on Thursday, though prices were well up to the mark. Upon *ex div.* variations, the turns were upward. Advances were made in Gas on Friday. Gaslight "J" and Imperial Continental rose 1 each; and Commercial debenture, 3. In Water, East London lost 1. Saturday's transactions were unimportant; and all quotations remained unchanged.

ELECTRIC LIGHTING MEMORANDA.

Electrical Locomotion in the City of London—The Plight of the Taunton Electric Lighting Company—Two Metropolitan Electric Light Companies—The Cardiff Fire.

THE most interesting electrical matter referable to last week was not directly connected with lighting, being the general meeting of the City and South London Railway Company, which, although the thirteenth in the history of the Company, was the first held since the undertaking has taken rank as a going concern. The line having been open for traffic for not more than a fortnight before the end of the half year, it was impossible for the Directors to prepare a revenue account for this short period; and therefore the statistical statements show nothing of the working results so far attained. At the meeting, however, the Chairman assured the proprietors that the new railway, with its electrical traction, was "in every way an unqualified success." Since starting, the Company have carried nearly a million passengers, their trains have run 60,000 miles, and nobody has been hurt. This is a very good story, so far as it goes. More precise information will be needed, however, before it can be determined for certain that electrical engineers will be justified in turning their attention from lighting to railway working. By this time next year the Company will be in a position to exhibit, for the instruction of the world, actual figures illustrating the technical and commercial aspects of electrical locomotion. Two questions are at present in suspense—that of the prospects of the Company, and the efficiency of electrical locomotion. Although these questions are closely bound up together, they will have to be separated when the Company's accounts are produced. The Chairman stated last week that "he felt pretty sure that electricity would be decidedly cheaper than steam as their motive power." This declaration is if anything rather too good; for after what has been learnt of electrical locomotion in different places where it has been tried, it must be regarded as highly satisfactory if the running expenses of the City and South London line do not exceed those of a railway using steam locomotives.

The Directors' report and the balance-sheet of the Taunton Electric Lighting Company for the past year, briefly noticed in the news columns of the JOURNAL last week, supply ample food for reflection to those who have been assured that electric lighting is a profitable business in English country towns. The Company's capital obligations amount to very nearly £18,000; but of this they owe £2217 to somebody, and have a balance of £85 to meet it with. According to the revenue account, the concern has lost £438 for the year, notwithstanding the fact that "installations" figure as part of the earnings. How much the lighting brings in is carefully not stated. It cannot be said that the Company pay too much for administration and management, seeing that all wages and salaries only cost £348. They owe their bankers £497, and £882 to sundry creditors. It is altogether a lively state of affairs. This is one of the celebrated "pioneer" electric lighting companies that have been exhibited as baits to travelling deputations of local authorities from different parts of the country. It is safe to assume, however, that copies of the report and accounts will *not* be distributed broadcast among people who have been instructed to regard Mr. Massingham and his associates as safe guides in the matter of electric lighting speculations. It only remains to be stated that the system in vogue at Taunton is that of the Laing, Wharton, and Down Syndicate, which is one of those selected for the street lighting of the City of London.

In a few days two of the most favourably situated London electric lighting companies will have held their general meetings, when we may be sure an effort will be made to put a different aspect upon this kind of enterprise from that which it wears in the West of England. It does not need to be said that the district of the St. James's and Pall Mall Company is one wherein electric lighting ought to pay if anywhere in the world. We regard this Company as by far the most happily situated in all respects of all such undertakings, whether in England or abroad. It is therefore interesting to see what they are making of their opportunities. According to the report of the Directors, the Company began the year with 4460 lamps of 8-candle power on circuit, which was increased by the end of the year to 26,500 lamps. The Directors state that practically the Company's station was only at work for three months last year, so that all their profit was made during this period. However this may have been, it is clear that the accounts are not yet put into rigid shape, whereby it might be perceived how the business is really paying. There is a profit balance of nearly £5000 to be dealt with, out of which, after paying £2412 for interest, a dividend after the rate of 5 per cent. is recommended. This Company's shares stand above par vlue. The other Company referred to is the Westminster Electric Supply Corporation, who claim that their business is prospering. Their central station is in Millbank Street, which is now supplying 9000 of the nominal 8-candle power lamps which these Companies prefer to employ as their datum. The Company are issuing more capital; and their shares are quoted at a premium. Both work on the low-pressure system.

Controversy has not quite ceased over the recent remarkable fire at Cardiff, when the Marquis of Bute and his supporters were dispersed, at the height of a civic banquet, by the accidental ignition of the hangings of their pavilion. It may be remembered that there was some dispute at the time as to the origin of the fire. The first report ascribed it to the electric lighting; but seeing that gas was also employed in the illumination of the pavilion, and that Chinese lanterns formed part of the scheme of decoration, we did not think it prudent to accept this hasty report as conclusive. The next statement circulated with regard to the fire was that one of the gas-burners had set light to a lantern, and thus caused the mischief. This was a reasonable explanation; and although it came from the electricians who had been employed upon the temporary installation, we should not have been justified in challenging its accuracy without further information. It now appears that the local authorities were dissatisfied with the electricians' explanation, and had the scene examined by an independent engineer, who has reported that it was the electric lighting arrangements after all which caused the fire, through an imperfect fitting, which gave rise to a short circuit. An arc was consequently formed at an improper place, and set fire to the hangings near it. This is, of course, a most damaging piece of intelligence for the electricians, because it illustrates the dangerous feature of electric light fires—that they may occur at any part of the circuit. It may be taken for granted that the credit of electricity for affording a convenient and safe means of decorative illumination is hardly so high in South Wales now as it was before the Cardiff disaster.

Mr. J. Cronin has been appointed Manager of the gas-works of the Bandon Town Commissioners, in succession to Mr. E. Martin. There were a large number of applications for the situation, in response to the advertisement which appeared in the JOURNAL a few weeks since.

THE CONSEQUENTIAL AND DIRECT BENEFITS OF INDUSTRIAL IMPROVEMENTS.

In the course of our last week's article upon the subject of experiments in gas manufacture, there occurred a remark which may be held to require some explanation. While insisting upon the desirability of having a clear understanding, as between the projectors of an experiment and those who are to be its judges, with regard to the data which are to be used in criticizing the results, we observed that "the statement of consequential advantages" affords plenty of scope for discussion between the two parties after everything likely to create misunderstanding has been removed. This question of the consequential advantages of an invention is a most important one; and it seldom receives sufficient consideration apart from particular examples. We propose therefore to devote a little space to the endeavour to set the question in a fair and proper light, where it can be seen without prejudice from any special application.

When an inventor has a happy inspiration, or when he sets himself to devise an improvement upon a certain manufacturing operation or convenience of civilization, it is reasonable to assume that he has some direct aim. He seeks a means of cheapening some product of art or manufacture, of removing some source of difficulty or danger, of making things comfortable, or attaining some other immediately and obviously desirable end by means that shall redound to his own as well as to the public benefit. As soon as he has convinced himself that this direct and immediate end has been reached by his device, the inventor proceeds to seek out the less obvious and more distant benefits which he can claim as consequential upon it. This is the point where, as a rule, the inventor and his critics part company, even if they have gone together so far. Yet it is unquestionable that the consequential results of any really valuable new invention in the arts and industries generally outweigh the immediate advantages, great as these may be. A new departure of comparatively small direct importance very often has a most widespread influence, and acts and reacts in directions which the wildest imagination could hardly predict as likely to be affected by it. The difficulty lies in the appreciation of these influences in advance. The inventor naturally dwells upon and magnifies them; while his critics, as naturally, discount them.

An extreme example of the manner in which the remoter consequences of an innovation may be controversially treated was supplied by an article in the *Spectator* upon steam road-rollers, published at the time when the right of highway authorities to increase the weight of these aids to road-making without regard to their effects upon buried gas-mains, &c., was finally disallowed by the Courts. This *ultra*-philosophical print thereupon piled up a dreadful catalogue of the consequences which might be expected to follow upon the disestablishment of the mammoth rollers. The roadways in town were to fall into ruts, carriages were to go out of use unless built as strongly as artillery waggons, rents were to fall in neighbourhoods rendered less accessible than before by the vehicles of the luxurious classes, and the abomination of desolation was to settle over the West-end of London because gas-pipes were no more to be at the mercy of steam-rollers. One wondered, at seeing this doleful picture, whether the man who first tried to get an order for a steam-roller from a public authority ever dared to paint their consequential advantages in the glowing colours which would fill in the converse picture to this. A similar piece of exaggeration was once put in circulation about the introduction of gas for lighting the carriages of the Metropolitan Railway. A harrowing description was written of the direful consequences that might be expected if, through any accident, a gas-lit train were to be broken up while in the tunnel. The gas was to escape and explode, of course; and this was not only to bring down the arch of the tunnel, but, seeing that the tunnel went usually underneath the roadway, a good deal of miscellaneous traffic was to be let down upon the wreck of the train; and, finally, the houses on each side of the thoroughfare were to topple down from their shaken foundations, and add to the general catastrophe.

Having in view the wonderfully expansive way in which statements of consequential advantages can usually be drawn up with reference to intrinsically small inventions, some critics of such things resolutely exclude everything of the kind from their purview, and judge every proposal upon its immediate bearings. This is as great a mistake as going to the other extreme, of allowing inventors to claim anything and everything they please under the head of consequential benefits. The line must be drawn somewhere; but it is at times hard to say where. An idea of what is required in this respect may be obtained from the analogy of capital and working expenses for general purposes. As it is not always the cheapest thing that is most economical in the long run, so it is not always the most striking novelty that has the widest influence. No general rules for such matters can supersede the necessity of exercising judgment upon every case according to its merits.

It is undeniable that inventors have frequently prejudiced their position with impartial judges by a too imaginative way of exhibiting consequential advantages, and a too sweeping forgetfulness of the possible existence of consequential objections. At the same time it is very certain that, as technical progress is continued, the possibility of suggesting immediate advantage to be derived from alterations in any direction grows smaller and smaller. In the case of the steam-engine and the gas-engine, for example, the fact that a balance-sheet of energy supplied and work done can be prepared with a very high degree of accuracy, limits the possibility of advance to one or two ways. In coal carbonization and electrical engineering also there are more matters of practice beyond which the notice, "No Thoroughfare," might be set up as a warning to inventors than there are open roads for improvement. The argument might be strengthened if necessary by illustrations drawn from many other branches of technics; but sufficient has been said to point the conclusion, which is that, in a vast field of industrial effort, whatever improvements it may be yet worth while to make will have to be recommended more by their incidental and consequential advantages than by their direct superiority over existing methods. More and more frequently we must expect to hear it said when different industrial processes are discussed, that some one or another is to be preferred, not because it is cheaper or turns out better work than its rivals, but because it facilitates the production of some desirable effect with which at first sight it may not appear connected.

Wherefore, when inventors and their critics meet to talk over any new project, it would only be reasonable if, instead of hearing each other's hypothetical claims and objections with more or less mutual distrust, as is so often the case now, both sides would admit the proposition that the value of a novelty may be very gravely affected by considerations which neither party can pretend to foresee. So long as inventors remain human, they will persist in seeing more promise in the children of their brain than strangers are willing to admit. It is therefore useless to urge anything, by way of moderating counsels, upon gentlemen who are fully possessed of such notions as that the whole future of the gas interest hinges upon the adoption of a self-closing gas-stove burner. On the other hand, due recognition of the validity and importance of consequential considerations may beneficially operate in directing attention to the possibility of the improvement of familiar processes, the incidental disadvantages of which are likely to be felt most keenly by those who despair, through knowledge, of directly improving upon them. It becomes difficult to say sometimes which are the direct and which the incidental advantages of a new process; indeed, the two not infrequently change places. Thus, when an engineer states that, having adopted a certain suggestion with a view to economy, he finds in practice that, although the economy is not worth talking about, unforeseen benefits in the way of a reduced nuisance, &c., have accrued, the incidental advantage obviously becomes the sole recommendation of the process.

Strictly speaking, an incidental is not the same as a consequential effect. The distinction is not unimportant. An effect may be characterized as incidental when, although considerable, it is not sufficient to justify the adoption of the prime cause on its own account. Thus, while the use of coke-breaking machinery in a gas-works yard usually leads to more systematic stacking of the residual, which in turn means a certain diminution of waste, this is only an incidental, not the sufficient primary advantage of their use. Again, the recent general adoption of coke-breaking machines in gas-works, supplies a clear illustration of the fact that a consequential advantage may be the principal and sufficient one. Broken coke has been sold at gas-works from time immemorial; the breaking being done by hand, and as a favour to customers. Under these conditions, there was very little advantage to the gas company in the breaking of coke. The process entailed a good deal of waste; and the slightly higher value of the broken coke was not worth regarding. There came a time, however, when the production of coke seemed to overtake and surpass the demand; and stocks went up mountains high in the largest works, notwithstanding heroic efforts to keep them down by selling off the commodity at a mere song for distant consumption. Then attention was directed (mainly by engineers, and not by the dealers in coke) to the possibility of putting the breaking of coke upon a new footing, by the extensive use of machinery, and pushing the sale of the prepared product. Success, as is well known, attended the experiment. The supply was caused to create the demand; and in many parts of the Kingdom the coke trade entered upon a fresh phase. Yet in this case the immediate and direct advantages of coke-breaking machines were by no means obvious or considerable; all the good effected through their use being essentially consequential.

This example ought to be instructive. The same lesson might be even more forcibly drawn from contemporary experiences with carbonizing and coal-handling machinery and gas purification and carburetting methods. To do so in this place, however, would involve mention of matters respecting which controversy exists; and the general purpose of this article would be thereby obscured. It will be sufficient if we have proved the contention that not only may the consequential effects of new processes and inventions in gas manufacture, as in other industries, be very important and far-reaching, and therefore as worthy of consideration as more immediate claims and results; but, as technical knowledge extends, the direct and obvious improvements of apparatus and methods of working must also be less frequent, and consequential and remote benefits must be taken more and more into account in judging new departures.

NOTES.

American Tar Paving.

According to the specifications issued for the street paving of the city of Washington, the best practice in coal-tar paving work in the United States is as follows: The pavement consists of what is called a base and binder 4½ inches thick, with a wearing surface 1½ inches thick when compacted. The ground is excavated to the required depth, or deeper where soft material is met with, and then thoroughly rolled with a heavy steam-roller. The base, which is first laid upon this, consists of clean-broken stone that will pass through a 3-inch ring, well rammed and rolled to a depth of 4 inches and then thoroughly coated with tar cement. The second or binder course is composed of clean-broken stone, thoroughly screened, not exceeding 1½ inches in the largest dimension, and coal-tar cement. The stone is heated to a temperature between 230° and 250° Fahr. by passing through revolving heaters, and is mixed with the tar in the proportion of about one gallon of tar to a cubic foot of stone. It is rammed and rolled while in a hot, plastic condition. The wearing surface is composed of about 60 per cent of clean sharp sand, 25 per cent. of broken stone or rock dust, 15 per cent. of the coal-tar cement, 0·9 per cent. of hydraulic cement, 0·15 per cent. of slaked lime, and 0·1 per cent. of flowers of sulphur. The sand is to be clean river sand, free from clay, and of such size that not more than 20 per cent. shall be retained upon a sieve of 20 meshes to the inch, and not more than 5 per cent. pass a sieve of 70 meshes to the inch. The stone dust is the residue from the crushing of stone for the base and binder, which passes a sieve of 6 meshes to the inch. The paving cement is composed of 25 to 30 parts of refined Trinidad asphalte, and the remainder of coal-tar paving, which latter must be free from excess of sooty matter, naphthalene, and creosote oils, and possess approved consistency. All the materials are heated before being mixed, except the hydraulic cement, lime, and sulphur. The surface is to be rolled hot, and finished with a dusting of dry hydraulic cement.

Naphthalene for Timber Preservation.

One method whereby gas undertakings may be helped to prosper is undoubtedly by the managers and their friends acting as agents for the diffusion of information respecting the advantages of using derivatives of gas making for all suitable purposes. Among these residual materials for which a more extensive market is desirable, is naphthalene. Some years ago Mr. Henry Aitken, of Falkirk, discovered the value of naphthalene as a preservative for timber; but the process devised by him for using the material for this purpose has not become so popular as its merit deserves. It is not desirable to supersede the creosoting process for preserving timber intended for rough structures and marine work; creosote oils being, equally with naphthalene, a coal-tar product. The advantage of naphthalene is, however, that it can be used for carpentry work in general, as it neither renders timber more difficult to cut, nor does it interfere with painting or varnishing. Moreover, it is exceedingly easy to apply; and does not require any prolonged seasoning or other preparation of the timber. The process consists in melting naphthalene in a tank, which can be done by the heat of steam-pipes in the bottom, as only a temperature of from 180° to 200° Fahr. is required. In this bath the timber is to be soaked for a period of from two to twelve hours, depending upon the bulk of the piece. The naphthalene makes its way through the pores of the wood, decomposing the albumenoid compounds, and displacing both sap and water. It then becomes fixed; and the whole substance of the timber is permeated with solid antiseptic of an unalterable character. Neither damp nor insects will attack timber so treated, which will keep good in any climate. Experiments with the Aitken process might be conducted in the carpenters' shops of gas-works doing their own repairs, and the results published.

Natural Gas.

In connection with the natural gas supply of America, it is reported that some of the largest companies contemplate restricting their business to the supply of private consumers and steam-boilers. With regard to its value for the latter class of work, it is stated that in return-flue boilers 50 cubic feet of natural gas will yield 1-horse power on the brake for one hour. The heating power of natural gas is usually given as 1000 cubic feet = 55 lbs. of bituminous coal. By analysis its average composition is: Hydrogen, 22 per cent.; marsh gas, 67 per cent.; other bodies in small quantities, 11 per cent. Stated in another way, there would be required to furnish 1-horse power for one hour, 19·4 cubic feet of coal gas; 83·4 cubic feet of water gas; or 50 cubic feet of natural gas. (These figures are published by a local authority in Pittsburgh, and are obviously open to criticism.) The coal gas is evidently assumed here to be used in a first-class gas-engine; while both the water gas and the natural gas are supposed to be burnt in boilers, which naturally affects the comparison. Whether from the costliness of such machines in the States or the cheapness of natural gas, it is apparently not usual to consume this gas in internal-combustion engines. The general output of the largest of the Pittsburgh natural gas companies, which has notified the intention to cease supplying iron-puddling furnaces, and to put all consumers upon meters, recently attained about 1000 million cubic feet per day, which had to be collected from a considerable area.

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The members of this Institution held their coming-of-age gathering—the Twenty-first Annual Meeting—at the Grand Hotel, Manchester, last Saturday. There was a large attendance, including many old members who have of late been only occasionally seen at the meetings. The PRESIDENT (Mr. W. W. Hutchinson, of Barnsley) was in the chair; and, in an opening observation, expressed his pleasure at the satisfactory attendance on so memorable an occasion.

MINUTES OF LAST MEETING.

The HONORARY SECRETARY (Mr. S. S. Mellor, of Northwich) read the minutes of the last meeting, held at the Memorial Hall, Manchester, on Nov. 29 last, and these were confirmed.

NEW MEMBER.

Mr. W. Severs, Manager of the Lymm Local Board Gas-Works, was elected a member of the Institution.

REPORT OF THE COMMITTEE.

The SECRETARY next read the annual report of the Committee, as follows:—

The Committee, in presenting the twenty-first report, have much pleasure in congratulating the members on the continued success of the Institution, and on the fact that it has, during its existence of 21 years, been the medium of eliciting and recording a mass of valuable information, thereby advancing the profession of gas engineering, and very materially benefiting the general public.

Four new members have been elected during the year. The Committee regret that one member—Mr. C. L. Hartley, of Middleton—has been removed by death since the last annual meeting. He will be much missed by those who knew him well. Three cease membership under Rule 1; and three under Rule 17—leaving 91 on the roll of members.

The opening meeting of the year was well attended, when the President gave a very interesting and instructive address. The adjourned discussion on the "Dinsmore Process" was taken, when Mr. Isaac Carr gave a supplemental paper, which provoked a very good debate.

The May meeting, which took the form of an excursion to Matlock and district, was very well attended. Haddon Hall and several places of interest were visited, under the guidance of Mr. R. Hall, Manager of the Gas-Works, Matlock, and a most enjoyable day was spent.

The third meeting of the year was held at Lancaster, in August, and proved very popular, as evinced by the exceptionally large attendance. The Corporation gas and residual products' works were visited under the guidance of Mr. Charles Armitage, the Engineer, who gave a description of the works and the results obtained therefrom. Lancaster Castle was also visited; and the various items of interest were especially well explained by Mr. Roper, Deputy Town Clerk of Lancaster. The members then adjourned to the Council Chamber, which the Mayor had kindly placed at their disposal. The thanks of the members are due to the Mayor, for his hospitality on the occasion, and for his kindness in placing the room at their disposal. The discussion of Mr. Newbigging's paper, on "The Utility of Water in Gas Manufacture," read at the previous November meeting, was then taken. Mr. G. E. Saville, of Todmorden, read a useful paper, on "A Combined Washer or Tar Extractor and Exhaust Regulator." At the close of the meeting the members and friends were conveyed to Morecambe, where they took tea together. The thanks of the members are due to Mr. Armitage, Mr. Duff, and other gentlemen, for their efforts in promoting the success of the Lancaster meeting.

The November meeting, which was held in the Memorial Hall, Manchester, was (in consequence of the severe weather) only moderately attended. Mr. T. O. Paterson, of Birkenhead, was unanimously elected President for the ensuing year. The paper by Mr. G. E. Saville, read at the previous quarterly meeting, was then discussed. Mr. W. R. Chester, of Nottingham, contributed a valuable paper on "The Supply of Steam to Regenerator Furnaces," which was fairly well discussed. Mr. W. Gadd, C.E., of Manchester, gave "A Physical Demonstration of the Forces required to resist Wind Pressure on a Gasholder guided from the Base." A discussion having taken place, Mr. Thomas Newbigging, C.E., of Manchester, read a paper on "Lime Burning;" and, by consent, the discussion was adjourned.

The thanks of the Committee are due to those gentlemen who have so ably supported the Institution by contributing papers; and they trust that other members will, during the coming year, offer to follow their good example.

The Committee, in submitting the statement of accounts, are glad to be able to report that the balance standing against the Institution is now discharged, and that there is a small balance in hand. The unpaid subscriptions are also very much reduced; only five members being in arrear.

One of the members of the Committee, Mr. W. Woodward, has resigned during the year; and his place on the Committee has been filled up by Mr. John Cockcroft, of Littleborough, one of the oldest members of the Institution. The members of Committee who retire by rotation are Messrs. Chester and Dalgliesh.

The question of the most efficient method of discussing any papers read will engage the attention of the Committee during the coming year.

W. W. HUTCHINSON, President.
SAML. S. MELLOR, Hon. Secretary.

The PRESIDENT moved that the report and statement of accounts which had been printed and circulated be adopted.

Mr. T. O. PATERSON (Birkenhead) seconded the motion.

Mr. J. BOOTH (Southport) congratulated the members of the Institution on the very satisfactory financial report which had been presented. The smallness of the amount of subscriptions in arrear was very satisfactory. He wished to suggest that the financial statement should be issued with the printed record of their proceedings. Hitherto it had been omitted; and it would be as well to include it.

The PRESIDENT said he was under the impression that the accounts were always printed with the report of the Committee.

The SECRETARY observed that they had not for the last four years, at any rate.

The PRESIDENT agreed with Mr. Booth that this ought to be

done; and it would be in future. They must congratulate themselves on being out of debt on their 21st anniversary. It was a very proper position for anybody or any institution to be in when attaining their majority.

The resolution was carried.

ELECTION OF OFFICERS.

The next business was the election of two Vice-Presidents.

The PRESIDENT proposed that Mr. C. Armitage, of Lancaster, should be the Senior Vice-President.

Mr. J. BRADDOCK (Radcliffe) seconded the proposition; remarking that Mr. Armitage had shown himself so willing to advance the interests of the Institution and its members at all times, that there could be no question as to the desirableness of retaining him upon the list of officers.

The resolution was carried.

The PRESIDENT explained that Mr. Armitage was absent owing to ill-health; and said the next business was to elect a Junior Vice-President to act in the absence of the Senior Vice-President.

Mr. PATERSON proposed that Mr. W. R. Chester, of Nottingham, should be the Junior Vice-President. It was not, he said, necessary for him to say who Mr. Chester was, or what were his capabilities. He was well known to all the members, had charge of very important works, and in every respect was a gentleman in whom they could place trust.

Mr. J. CHADWICK (Oldham), in seconding the proposition, observed that Mr. Chester was an old member of the Institution, and had served a full term on the Committee with great efficiency.

Mr. A. SHIRES (Biddulph) said he should like to propose the name of Mr. J. Booth, of Southport, who had been an energetic member of the Committee; and he believed would fill the higher office with credit. He had not asked Mr. Booth's consent to this proposition, because he had expected that he would this year have been nominated Vice-President.

The PRESIDENT said Mr. Shires had answered the question which he was about to ask, and had told them that he had not Mr. Booth's consent to his proposition. The Committee were entirely in the hands of the meeting.

Mr. BOOTH explained that he was about to rise, when the President interposed, to say that he could not consent to Mr. Shires' proposal. The Committee, he took it, had made arrangements for filling the office of the two Vice-Presidents; and he could not stand in the way at the present time.

The PRESIDENT said the amendment redounded to the good nature of its proposer; but he should have taken care to obtain the consent of the gentleman he named before he made the proposition.

Mr. SHIRES said no one approved more heartily of Mr. Chester's selection than he did; but he thought that, as Mr. Booth's name had to be withdrawn last year, on account of seniority, he would have been selected at this meeting. He had not a word to say against Mr. Chester, though he was a junior rather than a senior member.

Mr. W. WOODWARD (Bromley) observed that Mr. Chester could hardly be described as a junior member. He had been connected with the Institution for years, and had control of large gas-works and chemical-works, which gave him a double claim upon them.

The PRESIDENT agreed with Mr. Woodward that Mr. Chester could not be described as a junior in connection with the Institution. That, however, was not to the question; and in this respect, they need make no distinction between the two gentlemen. The amendment was not seconded; and he should put the motion.

The motion was then unanimously carried.

Mr. J. HEPWORTH (Carlisle) said it gave him great pleasure to move that Mr. Thomas Newbigging be re-appointed Treasurer. It was a position which he had occupied for some time, and no one could fill it better.

Mr. WOODWARD, in seconding the motion, said they ought to be proud that the name of Newbigging was associated with the Institution. It was a household word among gas engineers; and the Institution was honoured by having him as Treasurer.

The motion was carried.

Mr. NEWBIGGING said he was much obliged to them for this renewed expression of their confidence. At the same time he thought it was well to introduce new blood into the Executive of the Institution; and he should be very glad and willing to retire at any time, and should take no offence if anyone should propose his successor. He looked upon this motion as a kind of annual testimonial to his character; but others should be allowed to share the honours of it. It was very pleasant to meet on the twenty-first anniversary of the formation of the Institution. He was not one of the original members, as it happened. He never could understand why he was not, because it was on the day that a presentation was made to him, on his leaving for a foreign works, that the Institution was commenced. At the time the idea was that the members should meet for personal intercourse; and he could not have met with them once a quarter, seeing that he was 4000 miles away. However, he became a member later, and had taken care to preserve all the records of the Institution which had been printed; and he had them there that day in two goodly volumes. The quantity might have been greater; but they must console themselves with the thought that, if there was not quantity, there was quality. In looking through the proceedings, it was very gratifying to notice the number of interesting papers which had been presented, and to read also the excellent discussions which had almost invariably taken place. It was pleasant to have such a record of twenty-one years.

The PRESIDENT next proceeded to move that Mr. S. S. Mellor to be re-elected Hon. Secretary. He said they would all agree with him that they could not have a better occupant of that office. Mr. Mellor's heart was thoroughly in his work; and he spared no effort to make everything go satisfactorily.

Mr. PATERSON seconded the motion.

Mr. WOODWARD supported the motion, remarking that, as an old member of the Committee, he could bear testimony to the fact that no one could do the work less ostentatiously or more satisfactorily.

Mr. C. WOOD (Bradford) also supported the proposition; and it was carried unanimously.

Mr. MELLOR, in reply, said he was obliged by this renewed mark of their approval. It was certainly an onerous and hard-working position; and he fancied that, if some of the other members would take it when he had done with it, they would find it so.

The PRESIDENT said the next business was the election of two members of the Committee. A few years ago it was thought desirable to leave the initiation in matters of this kind to the members; but the Committee had come to the conclusion that this did not always result in the best men, or the most suitable men, or those with most claim to the position being selected. They had therefore reverted to the former procedure; and he moved that Mr. W. Duff, of Morecambe, and Mr. W. S. Haddock, of Warrington, be elected members of Committee.

Mr. J. TIMMINS (Wigan) seconded the proposition, and remarked that both gentlemen were admirably qualified for office. He had known Mr. Duff for a great number of years; and there must be only one opinion among those who had the pleasure of his acquaintance as to his ability at some future time to fill the position of President.

The resolution was adopted.

Mr. DUFF expressed his thanks, and said he should be glad to do everything he could to promote the interests of the Institution.

Mr. SHIRES proposed that the retiring Auditors (Mr. W. Smith, of Hyde, and Mr. J. M'Kenzie, of Wilmslow) be re-elected.

Mr. BOOTH seconded the motion; and it was carried.

INTRODUCTION OF THE NEW PRESIDENT.

Mr. HUTCHINSON said the time had now arrived when he had to resign the honourable position of President, which they were pleased to confer upon him twelve months ago. In one sense it was a pleasure to retire from the office, for it had been onerous in many ways. It was satisfactory to him to give way to one in whose hands the interests of the Institution would be well cared for, and who heartily deserved their support. He hoped the members would agree with him that the office was handed down with unimpaired efficiency, good fellowship, and integrity. He was very pleased to acknowledge the fact that all the members had cordially co-operated with him in maintaining the high character of the Institution; and he trusted they would extend to his successor the kind consideration which they had bestowed upon himself. Without further words, he had now the pleasure of introducing his successor, Mr. T. O. Paterson.

The PRESIDENT-ELECT, who was received with applause, then took the chair, and proceeded to read his

INAUGURAL ADDRESS.

GENTLEMEN,—Just twenty-one years ago, ten gentlemen intimately connected with our industry met in this great city. The primary object of that meeting was to present a token of respect and to bid an affectionate farewell to one we all know, one we all respect and honour—Thomas Newbigging. It is recorded in gas history that Mr. Newbigging left our shores for Pernambuco early in 1870; and it is also known that he has long since returned to us from that distant land, and that the force of his presence permeates throughout our system. To sum up, Newbigging is, so to speak, a medium through which we pass in the pursuit of our career. As the seed-bud of the Manchester District Institution of Gas Engineers was discovered on the occasion mentioned, I think it will be of interest to members generally to give here the record of the first proceedings on Feb. 26, 1870. Therefore I cannot do better than quote the words written at the first meeting:—

After the business of the presentation] a unanimity of feeling was expressed by the gas engineers present as to the desirability of their being enabled to meet more often together for an interchange of thought, and to discuss any matter appertaining to gas manufacture and distribution. The gentlemen present at this meeting formed themselves into a Provisional Committee to establish "An Association of Gas Engineers" to be held in Manchester, to be comprised of gas engineers and managers of gas-works situated within a certain radius of Manchester. The following is a list of names and offices of the gentlemen present at the meeting, and appointed to establish the Association: Joseph Wood, Chairman; Wm. Longworth, Secretary (pro tem.); Harrison Veevers, Robert Dempster, Isaac Kelsall, Wm. Smith, Wm. Blackledge, John Booth, James Braddock, David Brandwood. The Secretary was requested to draw up a circular stating the object of the Association, and to forward a copy of the same to each of the

neighbouring gas engineers or managers. The name proposed to be given to the Association to be determined upon at a future meeting; but for the present, and until alteration, the Association shall be styled "The Manchester District Association of Gas Engineers." The first general meeting to take place immediately after the replies to the circular have been submitted to the Provisional Committee.

The foregoing is a complete extract of the business transacted by the Provisional Committee at their first meeting. On March 12, 1870, they again met to consider the replies received by the Secretary; and it appears that twenty gentlemen wrote, signifying their intention to join the new Association. Rules were drawn up at this meeting, to be submitted for approval at a general meeting; and the Secretary was instructed to forward a copy to each member. The first general meeting was called on the 26th of March, when the report of the Provisional Committee was read and adopted. At this stage the "ship" had, it may be said, fairly left the builder's yard, and was under way; therefore I will not detain you much longer on matters of history. But before proceeding to other subjects of moment and of recent date, it is well to note two important resolutions carried at subsequent meetings. At a quarterly meeting held on Aug. 25, 1877, a resolution to the following effect was adopted: "That in future the title of this Society shall be known as 'The Manchester District Institution of Gas Engineers.'" A still more important change was made at the annual meeting held on Feb. 23, 1878, when it was resolved—"That the Institution shall consist of resident engineers or managers of gas-works in the employ of gas companies or corporations, and of gas engineers solely employed as consulting engineers, and not engaged as agents for any trading or manufacturing firm." The nature and power of the latter resolution is peculiarly significant at the present time; and our lasting thanks are due to Mr. Harrison Veevers for bringing forward such a resolution, and carrying it to a successful issue.

Now, gentlemen, I have cordially to thank you for the honour you have been pleased to confer upon me in electing me to the office of President of your Institution in the twenty-first year of its existence. I am but a young man in the ranks of the profession; and there are many who have a prior claim to that honour, and who are better fitted, from their longer experience, to guide the discussions of these meetings. The Institution has been distinguished from time to time by the valuable addresses of its Presidents, and the no less valuable papers of its members, which have proved in many instances, not only of general interest to the profession, but also of public benefit. The prosperity of the Institution up to the present time has been very satisfactory. The roll of membership has steadily increased; and at the present time the number is 92. Notwithstanding this, the question has often occurred to myself and to others: Are we deriving the fullest possible benefit or value from the power of the Institution? To my mind, we are not. By examining the Board of Trade returns, it will be found that we represent about £10,000,000 sterling of capital employed in our various undertakings; and although with that money we manufacture light, it must be admitted that we are ourselves in semi, if not in utter darkness in many respects, and are simply feeling our way. Cannot, therefore, the forces of the Institution make an advance still further, and grapple with important debateable subjects in a more practical and exhaustive manner than any one individual member can be expected to do. It is no doubt true that we are unable, with our present finances, to enter upon a thorough system of theoretical and practical experiment to clear away the mystic "ifs" and "whys" which present themselves; and it may fairly be said that it is not incumbent upon us to do so. Should we, however, resolve to institute inquiries from time to time on concrete subjects, where is the "inevitable" to come from? I say, without reserve, that it should come from the companies and the corporations under whom we serve, as they must directly benefit from the inquiries instituted. The total cost for experts would be the amount paid for their services, *plus* printing, and less received for sales of results to other undertakings throughout the country, and I may say throughout the world. Should these results be of a searching and thorough character, the income on the sales would go largely towards balancing the account. I do not propose that boards and committees should be asked to contribute an annual fee to the Institution; far from it. My object is to take up a given subject at any time, and, if possible, exhaust it; the cost of the inquiry being borne by the undertakings on the books of the Institution. Take as an example petroleum oil as an enricher of gas. What a comfort it would be at the present time, to those who are struggling under heavy cannel prices, if they could commence with confidence to use oil as a substitute, in a scientific and at the same time practical manner. Standard data on many points are required; and I believe much might be obtained somewhat in the way suggested. There is another point I may mention here, and that is the issuing of monthly or quarterly returns, giving the current prices of secondary products obtained by the members. Such information I believe would prove useful, both when received and afterwards for a reference.

In preparing an annual address, one naturally first tries to discover what is our position to-day; and, when this is done, to place it in a progress-balance against our position last year, and note the gain or loss. To-day it is not my intention to inflict upon you such minute acts of cruelty, but rather to take a casual glance along the line of events of the past year,

It may be said that in most manufactories the price of raw material governs, to a large extent, the balance of profit on the undertaking; and in a gas manufactory no exception can be taken to the rule. Coal and cannel must be bought, and gas produced under all circumstances and at all times, whether it is produced at coal-famine rates or the reverse. There has been a steady advance in the price of coal since 1888. At that time the pit price for Arley Mine coal was 6s. 9d. a ton; and in 1890 the price had advanced to 9s. 10d. for the same class of gas coal —showing an increase of 45 per cent. These advances, we all know, are chiefly due to disturbing influences emanating from an unknown value—viz., the fair labour and fair pay of a collier. There appears to be no indication of a fall in prices, although some authorities think a decline will come before long. It is therefore beyond our power to do more in these matters than trust to good firms to put us on their most favoured terms when obtaining tenders.

With regard to residuals, we stand more in the position of colliery proprietors, inasmuch as we have something to sell; but even here we do not always obtain a fair market value. As an instance, last year a corporation invited tenders for tar. Three offers only were received; and the highest tender was 23s. 6d. per ton. Whether or not this price represented the market value, I leave each gentleman to judge; but I certainly am of opinion that it did not. In bygone times it was frequently urged that gas undertakings should proceed no further than the manufacture of gas, and should dispose of all their raw residuals. Gradually sulphate of ammonia forced its way forward; and at the present time a large percentage of gas-works carry on this branch of industry, and at a handsome profit compared with the old system. Tar distillation has made less progress, due probably to the process being somewhat dangerous, and more complicated in its manipulation than the treatment of ammoniacal liquor. But it may be asked, Why multiply tar distilleries? Is it not quite possible and perfectly reasonable to say, Let companies and corporations within a given area join together and erect large works and send their tar to be manufactured, sharing the profits according to the tonnage of the tar sent in. With respect to tar and ammonia products, there have been no changes of importance in the prices of these during the year, although I suppose manufacturers have a balance in their favour, notwithstanding a decline in the price of sulphate of ammonia.

Now for a few minutes let us consider some of the most important questions uppermost in the minds of gas engineers and managers in the conduct of their various works. Inventions and schemes come so rapidly into view in these days of high pressure, that our time scarcely admits of even a casual examination of the merits or demerits of a large number of them; but there are some which, when looked into, have a more lasting effect—tending to make us go back again and again, to think over or work out an idea. One such discovery is that of Mr. Claus, where he takes up an impurity in gas and applies it in such a way as practically to remove all other impurities usually extracted by lime and oxide of iron. Assuming that this process can be successfully mastered, and moulded into practical shape, we, when making coal contracts, practically buy all the materials necessary for producing and preparing the gas for the consumer. Since Mr. Charles Hunt contributed to The Gas Institute, in 1886, his valuable paper on this subject,* giving, as he did, minute details of the long series of experiments conducted at the Windsor Street Gas-Works, Birmingham, the Belfast Gas Department have tried the system on a large scale. As the experiments on which Mr. Stelfox is engaged are not yet completed, we are not in a position to form any estimate of the value of the process.

We have also before us, in active operation, the system of purification in which the use of oxygen plays a most important part. Mr. Valon, of Ramsgate, to whom we are indebted for the earliest information on the subject, states that by the proper use of oxygen—*i.e.*, using 0·1 per cent. in volume of oxygen for every 100 grains of sulphuretted hydrogen per 100 cubic feet of gas, or 1 cubic foot of oxygen for every 1000 grains—he is able to remove all the sulphuretted hydrogen and carbonic acid, and reduce the sulphur compounds to 6 or 8 grains per 100 cubic feet of purified gas. Mr. Valon also claims for this process a very much reduced lime bill, as no less than one million cubic feet of gas have been dealt with by the use of only two cubic yards of lime. These figures point to a large saving in new plant; and in those works where the plant is becoming overtaxed, a ready relief is offered by trying the oxygen process. In illuminating power, a rise of 5 per cent. on coal gas is stated to result. It would interest those members who manufacture 20-candle gas to know whether or not this 5 per cent. holds good. Altogether, the inception of this process seems to be soundly based, and to carry with it a stamp of genuineness. Mr. Belton, of Shrewsbury, speaks favourably of the process, though he expects to obtain still better results.

The new discoveries in purification which I have briefly noticed have each concentrated in them a worth which must prove beneficial in the end; so that if, in gaining that end, although the first costs are large, the results should be measured not only by economies, but also by the value of total abolition of nuisances which in some towns have at times resulted in serious litigations.

* See JOURNAL, Vol. XLVII., p. 1181.

In connection with manufacture we have the Dinsmore invention. It is now well known to all that the Dinsmore Company lay claim to the discovery of a process whereby they are able to manufacture from 20 to 21 candle gas without the aid of expensive cannels to attain this high quality. This subject has had a fair share of attention from men possessing the highest abilities in matters appertaining to gas; but, notwithstanding the fact that searching examinations and tests have been made by these gentlemen from time to time, there is undoubtedly something yet unexplained and undiscovered in the process, otherwise uniformity of success would obtain to a greater degree. I believe the same success attends the working at Widnes as heretofore; therefore all that can be said is that Mr. Isaac Carr must have discovered the missing link.

In continuing the important subject of carburetting poor gases, it must not be forgotten that the cannel coal beds in England are now being worked exceedingly heavily. The tendency during the past twenty years has been to increase the illuminating power of gas beyond the normal amount yielded by the best gas-producing coal; thus necessitating a general use of cannel. It appears that the primary cannel of Wigan King coal is largely exhausted. The cannel of the Wigan four-feet coal has only been worked for a limited period, as its value was not known until it was examined by my father in 1876. But since that date supplies have been extensively drawn; and as the area of this deposit is comparatively small, we cannot expect a very lengthened supply. The curley cannel of North Wales can only be obtained in minute quantities in comparison with the demand. Yorkshire and Derbyshire, we are told, are still rich in cannels; but in both cases cannels of the first order are absent—the beds consisting of what may be termed second-class cannels. To prevent any possible misunderstanding regarding this statement, let it be understood that what I mean by "first order" is the cannel of the Wigan four-feet coal, or a similar quality. In Scotland several of the old standard seams have disappeared, and others are being increasingly drawn upon from year to year. The owners of cannels are no strangers to the limited supply, and hence the excessive prices to which they have been advanced; and one of the problems of the day is to find a substitute.

Mr. Frank Livesey and other gentlemen have turned their attention to oil as an enricher of coal gas; and for this they deserve the thanks of the profession. It is not my intention to make many remarks upon this interesting subject, or to exhaust your patience further than to refer briefly to one or two points. Mr. Livesey's experiments show that by using a mixture of gasoline and crude spirit of naphtha, in about equal parts, he could, by vaporizing with steam, raise 1000 cubic feet of gas from 16 to 17 candles, at a cost of 1½d. to 2½d. for oil; giving a net cost of 1¾d. after deducting ¾d. for the value of the gas made from the oil. To obtain the same results by the use of cannel, he found the relative cost to be nearly 2½d.; thereby showing a saving to the extent of ¾d. in favour of oil. It appears that during the experiments a trial was also made to prove whether or not the vapour carried by the gas was of a permanent character; and, in order to determine the matter, a quantity of coal gas was raised 2 candles, and allowed to stand for five days, when, upon testing, it was found to be of practically the same illuminating power. These experiments are valuable, inasmuch as they tell us at once that we are not entirely dependent upon collieries for cannel. They, however, only introduce the subject to us in a businesslike manner; and it now rests with ourselves to proceed further on the lines indicated by Mr. Livesey in his experiments, or as practice may otherwise lead us. Professor Lewes has placed a store of information within our reach upon the subject of oils; and I doubt not that he will be largely drawn upon in our pursuit for a good substitute for cannel.*

Then, again, it may be said that this question of oil is nearly allied to water gas. Upon this I only wish to say a few words. Although we hear a good deal about water gas in this country, it has, with slight exceptions, only so far amounted to talk. But when we read statistics of what is done, and is being done, across the Atlantic in the supply of water gas—statistics that show a wonderful growth within a few years—it certainly suggests to our minds the question whether we shall not be justified before long in putting down, at least partially, water-gas plant as an auxiliary to our ordinary plant in mid-winter. Large volumes of gas can be produced and carburetted within a small area; and in a gas-works, where incandescent coke is ever at hand, a generator could at any time be put into full operation within a few hours. In this manner it appears to me that we could carburet with cheap petroleum, and, by afterwards passing the gas through a superheater, produce a cheap, and at least a brilliant gas to help us out of a temporary, and possibly a serious difficulty. The cost of petroleum, upon which the light depends, must inevitably be much greater here than in the country which produces it; but, on the other hand, our economical means of producing the gas must, to a considerable extent, tell upon the cost price in the holder. Another leading feature to be kept in view in these times of labour troubles is our position. Would it not be very much strengthened at the weakest and most important part of the year if we were in a position to start a water-gas plant?

* The information here referred to will be found in the third of the series of Cantor Lectures delivered by Professor Lewes at the Society of Arts in December last year (see JOURNAL for Dec. 16, p. 1240).—ED. J. G. L.

As we are discussing the producing section of a gas-works, let us look for a few moments into our retort-houses, and note the change of to-day as compared with ten or twenty years ago. If it is a moderately large house, we shall probably find smart work going on with our friend West's hand-stoking machinery. Note the condition of the men. They appear less fatigued, happier, and more capable of executing their work; and I am constrained to say that the working expenses, as given to me by a gas engineer well known to all of us, go to substantiate the observations I have noted down from time to time. With regard to power-stoking machinery, I can speak from past experience that the saving in fatigue to the men employed was very marked; but the saving in respect of the Corporation was also very marked—and I may say generally marked on the wrong side of the ledger. Now, however, we witness a different condition of affairs. Wherever a retort-house contains (say) from 130 to 150 mouthpieces in range, together with fairly regular work throughout the year, very clear advantages accrue from the adoption of power machinery; and it may also be said, without contradiction, that modern retort-house interiors wherein machinery is used contain a steadier class of men, who present an appearance less like Robinson Crusoe than those "in the old time before them." The results of labour disputes, among stokers especially, during the past two years have certainly armed us with arguments which certainly did not before exist in favour of machinery. These labour troubles have also brought into being the novel idea of placing retorts on an inclined plane. How far this change in the retort-house is going to place us beyond dependence on skilled stokers has yet to be determined; but the results so far are encouraging in many respects. Regenerative settings are another great improvement introduced within late years. This subject is one of the most important that we have to deal with, and in itself presents materials for an address, without touching any other branches of our profession. For this reason I do not intend to detain you with any arguments of mine, beyond saying that during the past six years I have had regenerators attached to settings wherever possible.

New departures from what might be termed accepted necessities in the construction of gasholders have also been taken. It is now proved beyond doubt that it is not absolutely necessary, for the safety of a holder, to erect columns or standards of any description. Practical proof of this is to be found in Manchester, where a third lift has been added on the wire-rope principle, the invention of Mr. Pease, to a gasholder 100 feet in diameter. And at Haslingden a two-lift gasholder 80 ft. 9 in. in diameter was erected in 1889 on the same principle. The reports received regarding the working of these holders are most satisfactory. At Northwich a telescopic holder, erected upon the principle discovered by Mr. W. Gadd, has been in daily action for upwards of twelve months. In this case the guidance and rigidity of the vessels are maintained from the bottom curbs. Mr. Mellor, our Secretary, reports that, under all conditions of weather, the holder has worked equally well, and has not caused him any anxiety whatever. Judging from examples already existing, there is good evidence to warrant at least 30 per cent. reduction in future in the cost of holders.

Before concluding, it may be of interest to mention a few facts concerning the progress made in Birkenhead relative to gas-stoves. This branch of our business was commenced in June, 1883; and it was intimated to all consumers that sample cooking and heating stoves and utensils could be seen and full particulars obtained, in the show-room at the Gas and Water Office, where a number of stoves and fires were connected. Up to 1884, comparatively few cooking-stoves had been let out, although a fair business had been done in gas-fires. In March, 1885, a gas exhibition was held in a hall in the town. Lectures were delivered by Mrs. Thwaites and Mr. T. Fletcher; and the advantages of using gas for cooking and heating purposes were brought prominently under the notice of the townspeople. The result was very satisfactory; and a demand arose for stoves which has since been more than maintained. At the close of our financial year in March last we had 320 stoves out on simple hire, 210 on hire-purchase, 160 for which the hire-purchase had been completed, and 70 sold outright—in all, 760 stoves; and 550 gas-fires had also been sold during the same period. The usual opposition from townspeople, supported by some members of the governing body, had to be met. The conditions of sale, &c., are as follows: Gas-fires are sold at 25 per cent. profit; time and materials for fixing charged at cost price. Cooking-stoves are sold outright at 22 per cent. profit; time and materials for fixing included in the price, which will rather more than cover the cost. Stoves on the hire-purchase system are charged at cost price, with a margin for time and materials for fixing according to size; 2½ per cent. per annum charged for repairs during the period of hire, with interest at 4 per cent. on the balance at the end of each year of hire. Stoves are let out on simple hire at a rent equal to 12½ per cent. per annum on the cost of the stove and materials; and as we write off 10 per cent. per annum depreciation, and charge to the stove account the cost of fixing, removing, and repairing, this branch is worked at an apparent loss. As a set-off, there is the indirect profit on the sale of gas; and the stoves will eventually stand in our stock account at a nominal value. The hire-purchase stipulates that the amount agreed upon shall be paid by 20 equal quarterly instalments; and the hirer undertakes not to remove the stove, or allow it to be removed,

during the period of hire without the consent (in writing) of the Corporation. If default is made in the quarterly instalments for a period of six months, the Corporation in addition to any other remedy they have, are at liberty to enter and resume full possession of the stove upon giving 24 hours' notice. The hire system has answered very well in Birkenhead. The majority of the stoves are let to occupiers of houses rented at from £20 to £40 per annum. There is very little difficulty in the collection of accounts; and business with this class of consumer is worth cultivating.

The following is an estimate of profit now made per annum owing to the increased sale of gas for cooking and heating purposes :—

760 cooking-stoves, at 20s. each per annum		£760
550 gas-fires, at 10s. each per annum		275
		£1035
Deduct interest on stock, £1929 at 4 per cent. .	£77	
Loss on stove account (including £66 attendant's wages)	111	
		188
		£847

This is exclusive of grillers, boiling-burners, &c. The day consumption on the two summer quarters before the introduction of stoves amounted to 10 per cent. of the whole; and it now represents 16 per cent. On the two winter quarters, the day consumption was formerly 26 per cent. of the whole; and now it is about 30 per cent.

Now, gentlemen, a few remarks about the electric light, and I will close. Some time ago, Mr. Alfred Clough, the Manager of the Liverpool Electric Supply Company, kindly accompanied me over the various electric stations now in operation in Liverpool, and explained in a general way the plant and working. The system in use in Liverpool is a direct-current continuous supply at a pressure of 110 volts. There are three systems now at work, containing plant capable of serving 15,500 16-candle power lamps; and the Company are at present supplying about 12,000 lights. The engines in use are Willans's central-valve compound, with cylinders 14 and 20 inches in diameter and with 9-inch stroke, capable of indicating 180-horse power. Ten are of the above size, and three with cylinders 10 and 14 inches in diameter, and with a 6-inch stroke, indicating 60-horse power. The framework of the engines is constructed so as to form a complete chamber all but air-tight, and inside a supply of water and castor oil is always provided. This is churned up by the movement of the cranks, and effectually lubricates the internal bearings. The dynamos have magnets of the single-inverted horse-shoe type, with massive wrought-iron limbs. The armature shafts are coupled directly on the crank-shafts of the engines. The battery of accumulators at each station is capable of supplying 500 lights at a time; thus enabling the machinery to be stopped at from ten to twelve o'clock at night, and in some cases entirely on Sundays. The accumulators are charged during the daytime. All the distributing-mains of the Company are laid underground. The largest feeding-mains are composed of 91 No. 9 wires, and have a sectional area of 1·57 square inches. The conductor is covered with two layers of jute yarn and boiled in refined bitumen. It is next wrapped with parchment tape, and covered with a lead casing. The lead is protected by an outside covering of rough jute yarn treated with asphalte and tar. The ordinary feeders are made of 61 No. 11 wires, having an area of 0·6 of a square inch, and the distributers of 37 No. 13 wires, ¾-square inch in area. The service-lines to the consumers' premises are made of 19 No. 14 wires, insulated and covered with lead pipe. The length of frontage, along which distributing-mains are laid, is 9¼ miles. The total length of single cable throughout the area is 41 miles; and the weight of copper employed in the mains is 210 tons. The light is generally used in offices, banks, hotels, &c., and in a fair number of shops; the latter taking it mostly for window-decoration—thus leaving the main lighting of the premises to be done by gas.

These few particulars regarding electricity in Liverpool bring my remarks to a close. I very much fear that the task allotted to me has been fulfilled in a very indifferent manner—that many interesting subjects have been entirely ignored, while others have been simply skimmed over. Of all this, I am only too well aware.

Votes of Thanks.

Mr. T. B. Ball (Rochdale) proposed a vote of thanks to the President for his Inaugural Address. Those who had passed the chair knew the difficulties which surrounded the composition of an address of that character. There were many things to be considered with relation to it, and not the least important of these was its length. It was certainly not for lack of material that Mr. Paterson had been forced to curtail the length of his address; for matters pressed themselves upon their attention every day, and there were many points in the address which he could no doubt have treated at greater length. But the President had had regard for their patience; and this no doubt was one of the reasons which presented themselves to him when he was composing the address, and caused him to compress it. He had pleasure in proposing this vote of thanks; and he hoped the result of the address would be that at the coming meetings they would have papers dealing with some of the points he had raised in it.

Mr. N. Meiklejohn (Longwood) seconded the resolution. He remarked that the address had been pleasant to hear, and would be instructive to read afterwards. He was particularly struck with the reference to the position which the oil-gas companies were now taking up. There was, he believed, one with its headquarters at Manchester; and another Company, following on the lines of the Dinsmore process, were making gas at about one-tenth the cost, and double the illuminating power. He had seen this process, and it certainly seemed wonderful; and if it should prove a practical success, it would lead to a large use of oxygen in the purifying process, and to the use of a small percentage of tar, in order to do away with the use of cannel.

Mr. Ball then put the motion, which was carried.

The President acknowledged the resolution; observing that if he had not bored the members during the delivery of what he felt was a very inefficient address, he was satisfied.

Mr. Harrison Veevers (Dukinfield) proposed a vote of thanks to the ex-President for his valuable services during the past year. He did not know, however, how Mr. Hutchinson could help being a good President, for he was the son of an old member and a former President. The same remark might be applied to their new President, who was also the worthy son of a worthy sire. For himself he had not the remotest doubt as to the capabilities of the ex-President. Knowing as he did the valuable services he performed as Secretary, and how hard he worked in that office, he was sure that his heart would be in the work of his position as President. He had done all that was necessary to preserve the Institution in its good condition. In connection with their twenty-first anniversary, he might remark that of the ten gentlemen who were at the inauguration of the Institution exactly twenty-one years ago, it was singular that the first and last names on the list were those of deceased gentlemen—Mr. Joseph Wood and Mr. David Brandwood. Two had gone from them in the way of profession—Mr. Dempster and Mr. Kelsall, both of whom had gone into trade; and therefore became ineligible to continue as members of the Institution. With regard to the remarks of the President as to the change in the constitution of the Institution, he might explain that it was in connection with Mr. Newbigging that that resolution was carried. Mr. Newbigging was not an engineer in charge of any particular works, and wishing to include him in their number, they altered the rule so as to make consulting engineers not acting as agents for any trading firm eligible for membership. He mentioned this as a compliment to Mr. Newbigging, whose services were thought so valuable to the Institution that special means were taken to secure them.

Mr. T. Duxbury (Darwen) seconded the resolution, and remarked that Mr. Hutchinson had had difficulties in connection with his duties at his works while he had been acting as President. They were difficulties which most of them had not had to deal with; and they had no doubt engaged his attention very considerably, and so rendered the duties of the President more irksome than they would otherwise have been. He had, however, had the interests of the Institution entirely at heart during the year, and had served them well and faithfully.

The resolution was carried by acclamation.

The Ex-President, in acknowledging the compliment, said that, if he had failed in any way in the discharge of the duties of his office, they must put it down to lack of time rather than of will to do what was requisite.

Mr. R. Hunter (Chester) moved a vote of thanks to the Committee for their services during the year. As a former Secretary and President, he knew that, however hard those officers might work, it was of very little use unless they were well supported by the Committee.

Mr. J. Furniss (Slaithwaite) seconded the proposition, which was carried.

Mr. W. W. Hutchinson proposed that the thanks of the members be given to the Secretary and the Treasurer.

Mr. Veevers seconded the proposition.

The President also bore testimony to the amount of willing labour put forth by the Secretary in arranging for the meetings of the Institution.

The resolution was carried unanimously.

Mr. Newbigging, in responding, said that whatever services he might have rendered, about which there might be some doubt, there could be no doubt as to those rendered by the Secretary. Mr. Mellor was a model officer, and had exerted himself constantly to further the interests of the Institution. He felt inclined to rise to support the vote of thanks to the Past-President; and, while he was on his feet, he might say that he did think that gentleman heartily deserved their thanks for the way in which he had conducted the business during the past year. They all remembered his Inaugural Address which would be useful for reference for many years to come.

Mr. Newbigging's Paper on Lime Burning.

A discussion on Mr. Newbigging's paper on "Lime Burning" (which was read at the previous meeting) was then taken. A report of the remarks of the various speakers will appear next week.

The members, and some friends, afterwards had dinner together; the toast list including "Founders of the Institution," "The President," "The Past-Presidents," "Prosperity to the Institution," and "Kindred Associations."

THE ANNUAL MEETING OF THE SOUTH-WESTERN (U.S.A.) GAS ASSOCIATION.

A recent number of the *American Gaslight Journal* contained the Inaugural Address delivered, and also a paper read by the President of the above-named Association (Mr. W. Enfield, of Dallas, Texas), at the annual meeting held in March last year. Although nearly twelve months old, these utterances afford interesting information as to the position of the gas industry in the district whence they come. After a glance at the advantages of Gas Managers' Associations, the President passed on to notice the advance of the electric lighting industry during 1889, as affording the necessary experience to start the members on the road of electrical engineering, which he held to be one of the things they should endeavour to master with due diligence and expedition. He expressed the belief that, when properly developed and worked on a commercial basis, there was money to be made in electric lighting. The advantages of gas-engines, as compared with steam-engines, for driving dynamo machines, were next considered. Mr. Enfield complained of the cost of the former as compared with other motor machines, which is so high as to considerably restrict their introduction. Although the electric light had been introduced, gas companies had not suffered much. The new illuminant had educated the public to demand more light for certain purposes, and stimulated the gas companies to enterprise in the way of introducing stoves and engines. With regard to stoves, the importance of exercising a little supervision in the way of seeing that they are properly used was mentioned; and Mr. Enfield was strongly in favour of supplying gas-fittings of all kinds at cost price. He considered them as similar to the freightage of ordinary goods; and a merchant would not, he said, expect to make a profit on the delivery of his produce to the customer. It was difficult to see any profit in the supply of water gas with anthracite at upwards of £2 per ton, coke at not much less, and Lima crude oil at from 2½d. to 3d. per gallon; though it might be introduced as an auxiliary to coal gas in large works, and as a means of using up surplus coke. Referring to modern improvements, such as the Coze inclined retorts, generator furnaces, hydraulic elevators, &c., Mr. Enfield said that all who were rebuilding or enlarging their works should have an eye to the possible introduction of these appliances. As to the fuel gas problem, he thought the solution lay in illuminating gas supplied at a reduced price.

The paper contributed by Mr. Enfield was entitled "Gas as a Source of Light, Heat, and Power." The writer said he believed progress was being made towards the distribution of fuel gas; and he urged a greater degree of enterprise in this direction. Good coal gas at 2s. 6d. was equal to water gas at 1s. 3d. per 1000 cubic feet; and it was a question if it could not be supplied in large quantities at as low a figure. The introduction of stoves and appliances must be taken up by the suppliers of gas, as stove dealers interested in the sale of oil and coal could not be expected to be anxious to extend the use of gas, nor could gas-fitters be expected to work at cost price. Meters, pipes, and burners should all receive careful attention. Good gas should be supplied, and every care exercised to have it properly used.

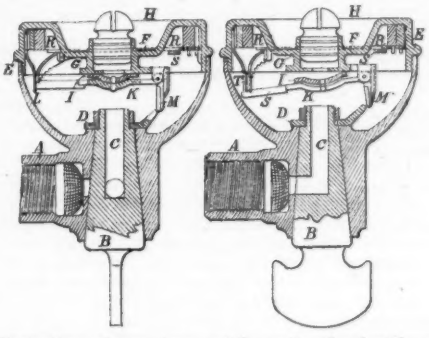
The Stockport Gas Engineership.—The Gas Committee of the Stockport Corporation yesterday week selected Mr. S. Meunier, (who for the past eighteen years has been in the employ of the Gas Committee of the Birmingham Corporation) to be Engineer of the works under their control—a position which was recently resigned by Mr. James Jacques. There were 35 applicants for the post, which is worth £400 a year.

South-West of England District Association of Gas Managers.—The twenty-seventh half-yearly meeting of this Association is arranged to be held at the offices of the Southampton Gaslight Company on Tuesday, the 10th inst. The Directors have not only allowed the use of their Board-room, but have made hospitable provision for the comfort of the visitors in the shape of a luncheon, as well as tea at the close of the proceedings; so that for once the members who have not a long journey to make will be independent of hotels and refreshment-rooms. After inspecting the gas-works in the morning, the party will asemble at the offices (which are in the Ogle Road) for luncheon. At two o'clock the meeting will be opened by Mr. S. W. Durkin (the Company's Manager), the President of the Association. After the usual preliminaries, he will deliver his Inaugural Address. The papers to be read follow somewhat on the lines of those submitted at the last meeting, so far as the selection of the subjects is concerned; but as they both refer to actual experiments, some novel and interesting information may be expected. Mr. E. C. Riley, of the Great Western Railway Gas-Works Department, will contribute "Some Notes of Experiments on the Position and Working of the Hydraulic Main;" and Mr. F. G. Dexter, of Winchester, will follow with an account of "Some Experiments on the Revivification of Oxide of Iron in Closed Vessels." As usual, discussion will be invited on each paper. As Southampton is easy of access to the majority of the members, it may be expected that a considerable number will avail themselves of the courtesy and kindness extended to the Association by the Directors, the Secretary of the Company (Mr. C. Crowther Smith), and the President.

REGISTER OF PATENTS.

Gas-Burners.—Clark, A. M.; communicated from A. P. Frechette, and D. Circe, of Carson, Nevada, U.S.A. No. 8603; June 3, 1890. [8d.]

The object of this invention is to provide a gas-burner with means for effecting the automatic closure of a valve, which cuts off the supply of gas to the tip of the burner should the flame be accidentally extinguished whilst the pressure of gas continues in the body of the burner.



The illustration shows two axial sectional elevations of the burner, at right angles to one another—the tap being turned to shut off gas from and to supply gas to the burner, respectively.

The body of the burner is substantially hemispherical in form, and has at the underside a socket for the plug B of the cock for controlling the supply of gas to the burner; the socket being reamed to taper from its lowest end, to receive the plug of corresponding form, and ground to a gas-tight fit. The plug has at its lower end a T-head, for turning it by; and an axial bore C extends from its upper end to a lateral orifice axially coincident (when the plug is open) with the bore of a lateral screwed pipe socket A. The bore of the plug opens into the body of the burner; and it is retained in place by a set-nut screwing on the threaded end of the plug. The top of the shell is a cap screwed into the shell until its bead E bears upon the edge of the shell with a gas-tight joint. The wall of the cap projects a short distance above the bead, and terminates with a flat top, which is cupped or depressed concentrically, as at F, and has a central aperture surrounded by an upwardly-projecting flange to receive the burner-tip H, and a downwardly-projecting flange G terminating at the lower end in a truly faced seat for a disc-valve I, attached to a lever K pivoted between ears formed on an arm projecting from the valve-seat; this lever being so pivoted that, when in a horizontal position, the valve will bear flat and gas-tight upon its seat. The lever K has a short arm or tail piece M at right angles to it, which projects downward sufficiently to be acted on by a toe carried by the washer D, when the latter is rotated with the plug of the cock for the purpose of turning on the supply whereby the valve will be opened. A spring affixed to this arm bears on the tail-arm M of the valve-lever, and tends to close the valve I upon its seat when the lever-arm is freed from the toe of the washer. To the free end of the valve-lever K is attached one end of a straight spring of thin steel or hard brass, forming a laterally-elastic prolongation of the lever; and a post T projects downward from the cap of the burner body in such a position that the spring prolongation of the valve-lever will align with the centre of the post, and abut edgewise against the lower end thereof when the valve-lever is drawn down so as to open the valve by the revolution of the plug of the gas-cock, in order to turn on the gas supply.

In the annular chamber formed within the cap of the burner body are seated two rings (the inner and heavier ring being formed of brass, and the outer or enveloping ring of steel or iron) of such diameter relatively to that of the annular chamber in which they are contained, and to the outer wall on which they are fastened by a screw O, that the screw holds them closely together. Two dowel pins are inserted laterally in the rings, near their severed ends, on each side of the cuts, so as to bind them together. Consequently when the rings are heated by conduction and radiation, they will by differential expansion separate at their ends so that the upwardly-projecting pins located on the outer opposing ends of the rings, and which are in line radially when the rings are cold, will be moved out of line. Upon these pins, as fulcra, is fitted one end of a flat bar R curved edgewise, and held against the underside of one of the rings, so as to work freely by a spring finger S attached to the ring and bearing lightly up against the bar. To the free end of the curved bar R a curved pawl is pivoted, and is free to vibrate vertically; the pawl having ratchet teeth cut in its lower edge, which rests on, and engages with, the top edge of the spring extension of the valve-lever K, over which the teeth will slide freely when the rings are being unequally lengthened by heat. When the burner and the rings become hot, the consequent expansion of the rings will cause the free end of the curved bar R to swing toward the side of the cap, which movement will draw a ratchet-cut pawl in like manner over the edge of the other spring; the pawl being held in engagement with this spring by a weight or ball attached to its free end.

By rotating the plug of the gas-cock, to turn on the gas supply, the end of the spring extension of the valve-lever will be caused to abut against the free lower end of the post T, as in fig. 2; and it will so remain until the plug is again turned to extinguish the gas, or until the flame at the burner-tip is accidentally extinguished while the plug is still open. As the shell and rings therein become heated, the ratchet-pawl is caused to move freely over the spring without dislodging it from the post; but when the flame is extinguished and the shell and rings cool, the motion of the ratchet-toothed pawl is reversed, and the spring is pushed from its position on the post T; the tail-spring of the valve-lever being then free to close the valve I, and thus prevent

any escape of gas at the burner-tip. The gas may be again supplied to the burner-tip for relighting by a revolution of the plug, which movement will cause the valve to open.

Gas Motor Engines.—Otto, N. A., of Cologne. No. 4823; March 27, 1890. [8d.]

In gas motor engines working with a cycle of four strokes, as heretofore constructed, there has generally been employed a countershaft driven through toothed gearing from the engine-shaft at half the speed of the latter, for the purpose of working the valve and other gear. The present invention has for its object to dispense with this gearing, whereby the engine is rendered simpler in construction, and works more quietly.

If the movement of the discharge-valve of the cylinder were effected by the engine-shaft, or by a countershaft revolving at the same speed, without special appliances, the discharge-valve would be opened during both the discharging and compressing strokes. But, in order to maintain the discharge-valve closed during the compressing stroke, according to the present invention, suitable apparatus is made to act upon the discharge-valve gear at the proper time, either: (1) By the action of the rarefaction produced in the cylinder during the suction stroke; or (2) by the action of the pressure produced during the compression or the working strokes.

Fig. 1 shows a longitudinal section of a motor engine with one arrangement of the apparatus applied thereto; and fig. 2 shows a view of the valve gear in a different position—both according to the first method.

The crank-shaft of the engine has an eccentric A or a crank placed at an angle of 90° to the engine-crank, and from which, by means of a rod B, an igniting-slide Z is actuated. A double-ended lever D is connected at its one end by a link C to the slide Z, so as to have a to-and-fro motion imparted to it thereby; and to the other end of the lever is pivoted a rod or pawl E. According to the position given to this rod, it will either be made to force open the discharge-valve F by bearing against the notched end of its stem during the forward motion of that end of the lever D, or it will miss the end of the valve stem when brought into the position shown at fig. 2; and thus allow the valve to remain closed. This shifting of the rod E is effected by the apparatus G, consisting of a hollow vessel or cup, closed by a flexible diaphragm H, which is connected by a link I to the rod E. The cup is made to communicate by a pipe K with either the air supply or with the gas-pipe.

The apparatus operates as follows: When an explosive charge is drawn into the cylinder by the forward motion of the piston, there will exist in the cylinder and in the gas and air supply pipes a pressure below that of the atmosphere; and this reduced pressure will be transmitted through the pipe K to the cup G. In consequence thereof, the diaphragm H will be moved inwards by the excess of external atmospheric pressure; and the rod E will be drawn thereby into the position shown at fig. 2. On the following inward motion of the piston, during which the slide Z will be moved to the left hand, the rod E, in

Fig. 1.

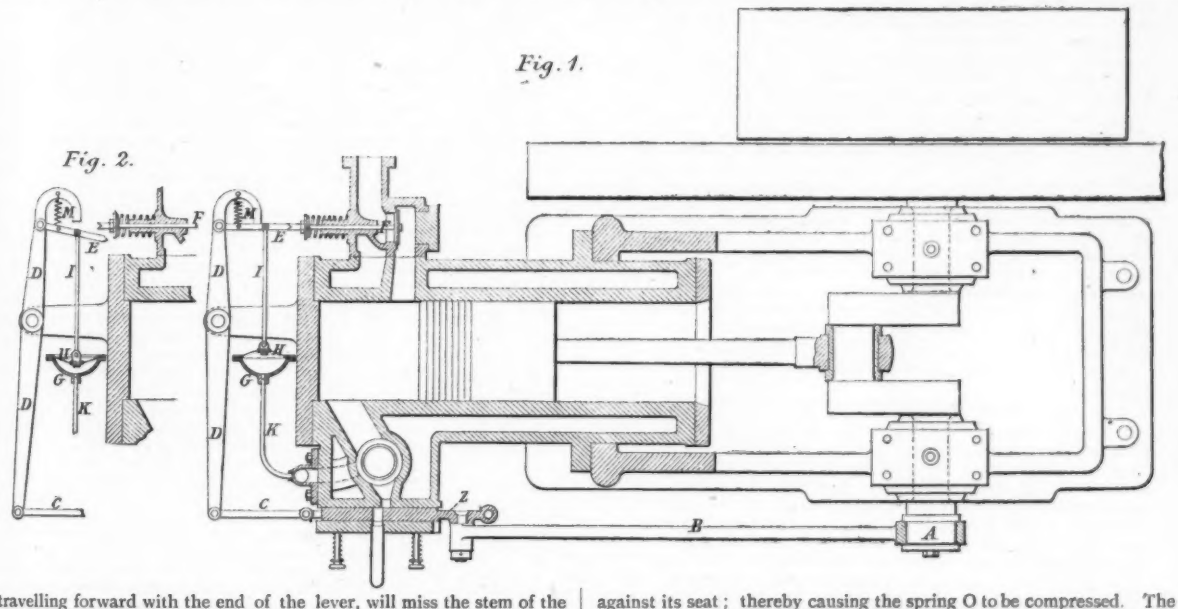
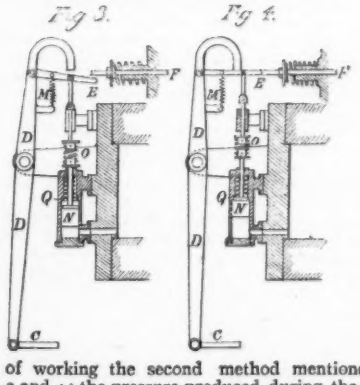


Fig. 2.

travelling forward with the end of the lever, will miss the stem of the valve F, and will move past it, as indicated. Consequently the discharge-valve will remain closed, and the cylinder charge will be compressed. At the following forward stroke of the piston, the explosion and expansion of the gases will take place. At the ensuing inward stroke, the slide Z will again move to the left hand; but in the meantime the pressure within the cup G will have become equal to the atmosphere, so that the spring M which acts upon the rod E will draw the latter back into the position shown at fig. 1, and, on the forward motion of the lever D, the rod E will force open the discharge-valve. This action will be repeated at every cycle of four strokes.

Fig 3. *Fig 4.*



The mode of working the second method mentioned above is shown in figs. 3 and 4; the pressure produced during the compression stroke or during the working stroke being utilized for influencing the mechanism actuating the discharge-valve. The rod E is acted upon by the spring M, which always tends to draw it out of gear with the valve-stem, so that, on the forward motion of the lever D, the valve is not opened thereby. To the rod E is connected a piston N, the outer end of which is coned as a valve, so as to fit on a seating formed in the small cylinder in which it works. Between the rod E and piston N is provided a spring O; and the space in the cylinder behind the piston N communicates with the engine cylinder by a small passage. During the compression stroke, the pressure forces the piston N outwards against its seat; thereby causing the spring O to be compressed. The rod connected therewith cannot, however, put the rod E in gear with the stem of the valve F, as by the motion of the lever D the rod E will have been moved past the stem. The ensuing pressure due to the explosion will keep the piston N in the same position; so that when, by the backward motion of the lever D, the end of the rod E has passed the end of the valve stem, the spring O will move back the rod in line with the stem, as at fig. 4, so that when, during the expelling stroke, the igniting slide moves to the left, thereby moving forward the outer end of the lever D, the rod E will force open the discharge-valve. At the following charging stroke, the decrease of pressure in the cylinder will allow the piston N to be forced away from its valve-seat by the atmospheric pressure, and by that of the spring O, whereupon the rod E will be drawn out of gear with the valve-stem by the spring M.

Gas Motor Engines.—Otto, N. A., of Cologne. No. 5273; April 5, 1890. [8d.]

In patent No. 4823 of 1890, there is described an arrangement of apparatus for working the discharge-valve of four-stroke-cycle gas motor engines without the use of a countershaft driven at half the speed of the engine-shaft (as is usually employed for this purpose); the apparatus consisting of a flexible diaphragm or piston subject to the variations of pressure either in the gas or air supply pipes, or in the engine cylinder, and which is connected to a rod on a reciprocating-lever, so as to cause the rod to open the discharge-valve during the discharging-stroke of the engine; but to leave it closed during the compression-stroke. There is also described a modification whereby, when, owing to the engine running too fast, the gas supply is cut off and only air is drawn into the cylinder, the diaphragm is made to open the discharge-valve at each instroke of the piston, in order to obtain a more uniform action of the engine. It is also stated that under these conditions the discharge-valve may be kept open during the whole suction-stroke, so as to draw in the previously discharged products of combustion, instead of or together with air. The present invention relates to various other modifications in this mode of regulating four-stroke-cycle gas-engines.

Referring first to the method of actuating the discharge-valve by the decrease of pressure produced in the gas or air supply pipes during the suction-stroke, according to one construction the patentee proposes to arrange a vessel closed by a flexible diaphragm, or it might be a cylinder and piston, to communicate with the gas-supply pipe at a point beyond the gas-valve; and he connects the diaphragm by a rod with a catch-rod pivoted to the stem of the discharge-valve. When

the diaphragm is not subject to a decrease of pressure in the gas-supply pipe, the gas-valve being closed, it holds the catch rod in line with a rod receiving a reciprocating motion from a crank, eccentric, or cam on the engine-shaft, so that, when this rod is moved forward during the instrokes of the piston, it will force the discharge-valve open by means of the catch rod. In this way the charge of air previously drawn in by the outstroke will be expelled again; but when, on the gas-valve being opened during the suction outstroke (for drawing in a combustible charge) the diaphragm shows the catch-rod out of line with the reciprocating rod, this will fail to open the discharge-valve on the following compression-stroke.

According to another arrangement, the vessel and diaphragm are placed in communication with the air-supply pipe, and the diaphragm is connected both with the before-mentioned pivoted catch-rod and with a slide-valve for admitting the combustible gas. The pivoted rod is connected to a spring, which tends to keep it in line with the reciprocating-rod; and a catch or locking device is provided, which, when the engine is running too fast, is caused by the governor to lock the pivoted catch in that position. Thus, when the engine runs at the normal speed, the diaphragm, when subjected to a reduction of pressure during the suction-stroke, will draw the catch-rod out of line with the reciprocating-rod, so as to prevent the discharge-valve from being opened during the following compression-stroke, and will at the same time move the gas-slide into the position for admitting an explosive charge into the cylinder. If, on the other hand, the engine runs too fast, the governor will cause the locking device to hold the catch-rod in line with the reciprocating-rod, so that the diaphragm cannot draw it out of line, and cannot bring the gas-slide into the open position during the suction-stroke; and therefore air alone will be drawn into the cylinder, and expelled during the following instroke.

Referring to the method of actuating the discharge-valve by the increase of pressure during the compression and working strokes, according to one arrangement, the inventor proposes to connect the diaphragm-vessel or cylinder and piston with the interior of the cylinder, and arrange the diaphragm or piston in combination with the gas-slide, and with a loop or frame that acts upon the pivoted catch-rod, so that when the increased pressure acts upon the diaphragm or piston during the compression and working strokes, it holds the catch-rod in position for causing the discharge-valve to be opened by the reciprocating-rod during the following expelling-stroke—the gas-slide being then closed; while when the piston or diaphragm is released from this pressure during the suction-stroke, it will allow the catch-rod to be moved by a spring or weight out of line with the discharge-valve stem, so as to keep the valve closed during the following compression-stroke, and will also move the gas-slide into the open position.

The governor is made to actuate a locking device; so that when the engine runs too fast, the device will lock the loop or frame in a position to hold the catch-rod in line with the discharge-valve stem, and will thus also hold the gas-slide in the closed position.

According to another modification of this arrangement, the governor locking device, instead of thus acting upon the frame of the piston or diaphragm, is made to act upon the catch-rod pivoted to the reciprocating-rod when the engine runs too fast, in such a manner that, when the latter has moved the catch-rod forward so as to open the discharge-valve, the locking device holds it in that position, and prevents the discharge-valve from closing during the suction-stroke. In this way the combustion gases are drawn back into the cylinder again. In order with this arrangement to prevent air from being drawn in through the air-supply valve at the same time as the products of combustion, the air-supply pipe is made to communicate with the chamber of the gas-slide valve, which is made with ports governing both the air and the gas supply; so that when the gas supply is cut off by the slide-valve during the suction-stroke by the action of the governor, the air supply will also be cut off.

APPLICATIONS FOR LETTERS PATENT.

2752.—WAITE, J., "Improvements in gas-stoves used for heating soldering-irons and other things." Feb. 16.

2790.—COMOLLI, L. A., and CONTEVILLE, C., "A continual burning gas-furnace." Feb. 16.

2815.—ROUZAY, M., "Improvements in gas or petroleum engines." Feb. 16.

2887.—THOMPSON, W. P., "Improvements in burners for burning oils or hydrocarbons, and more especially applicable for use in the burning of natural gas." A communication from G. S. Sanford. Feb. 17.

2889.—THOMPSON, W. P., "Improvements in apparatus for the manufacture of gas from petroleum oil." A communication from G. S. Sanford. Feb. 17.

2929.—WILLIAMS, H., "Improvements in mechanism for governing gas, oil, and similar motor engines." Feb. 18.

2948.—DINSMORE, J. H. R., "Improvements in or connected with the manufacture of illuminating and heating gases." Feb. 18.

2962.—WINTERFLOOD, J., "Improvements in automatic gas-valves as applied to water-heating apparatus." Feb. 18.

2976.—HUGHES, F., "Improvements in gas-engines." A communication from F. Cordenous. Feb. 18.

3021.—PAIN, A. C., "An appliance for actuating gas-taps." Feb. 19.

3025.—CUTLER, M. H., "Improvements in the application of gas for heating purposes." Feb. 19.

3034.—FANTA, F., "A new process for producing oxygen gas." Feb. 19.

The Electric Light in Palestine.—"There is no limit," says the *Financial News*, "to the enterprise of electric lighting. Palestine is its latest field; and its immediate centre a huge flour-mill, near the supposed site of Calvary. The Arab and other natives are said to be wonder-struck by the new light. When they emerge from this state, they may be tempted to invest their shekels; but they will be wise to do so with much caution. Electric lighting is rather tricky in respect of paying dividends."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Trouble with the Leeds Stokers.

SIR,—In your last issue, I notice a letter under the above heading from Mr. George Livesey's pen, in which he says: "The Union has, at the point of the bayonet, exacted terms." Nothing of the kind. The men certainly faced the bayonets of the Carbineers and the staves of the Yorkshire police to maintain their just rights—rights conceded to them by the Leeds Corporation Gas Committee in November, 1889, but which a certain Mr. Tooley wished to upset, for aught we know at the dictation of some outside party—very likely Mr. Livesey. Be that as it may, one thing is certain, that, as soon as a rupture occurred, Mr. Tooley and his son came at once to South London to procure "blacklegs;" and Mr. Livesey and another of his satellites (Mr. Somerville, the Engineer at the Bankside station of the South Metropolitan Gas Company) rendered him yeoman service in procuring same. I know this to be a fact, inasmuch as some of those men came to this office, and asked our advice what they should do; and we put them on strike pay. They succeeded, however, in getting about 140 men to King's Cross Station, where I and another met them, and induced some 40 or 50 to retrace their steps; and many a time since have those men thanked me for that advice, when they came to know the treatment the men who went to Leeds received.

Mr. Livesey seems to think that he is the only man in this country who is capable of managing a gas concern successfully—in fact, he no doubt is labouring under the delusion that with his demise the proper management of gas-works ceases. So far as we are concerned, he is welcome to entertain those ideas; but I cannot help pitying this man (who at one time bore a name among his workmen to be envied) taking the *rôle* of procurer-general of "blacklegs." I shall never forget the rebuff he received from Colonel Makins, the Chairman of The Gas-light and Coke Company, at their meeting on Feb. 6, when he (Colonel Makins) sarcastically replied to him. Fancy him attempting to throw "the apple of discord" between that Company and its workmen, who have been on the best of terms now for some time, and have passed successfully, without a hitch, through what I consider the most trying season in the whole history of the gas industry. "You know," said this peaceably-disposed gentleman, "you have those men in your power. Make them do as you bid them. If not, you can give them three months under the Conspiracy Act." Good George the First of the Gas Realm! Does he think that the Directors of that Company do not know how to deal with their men far better than he did with his? I think if he takes the advice given him on that day, it will have a beneficial effect upon his health; for he cannot deny that "a strike avoided is as good as, if not better than, a strike won." Well, we will say he has won his strike; but at a tremendous cost, which he nor his colleagues cannot deny. It is not "Heads, I win; tails, you lose," with this Union. What this Union was started for, Sir, was to secure better conditions for the workmen than Mr. Livesey and men of his kind hitherto were willing to give them. Compare the appearance of the men to-day with what it was two years ago; and he cannot deny that there is a vast improvement.

I am afraid, Sir, I am diverting from my reply to Mr. Livesey's letter. So to return. I see he draws a comparison as to the cost of carbonizing wages per ton for the last four half years. Well, I admit he is right when he says that a reduction of about 20 per cent. of work means a rise of about 25 per cent. in wages. That would account for the increased expenditure in the carbonizing department. But he forgot to mention that the price of gas supplied by the Leeds Corporation, who own the works, is 1s. 11d. per 1000 cubic feet; whereas he charges 2s. 3d. per 1000 feet for an inferior article, as I know the illuminating power of the gas is not so great in London as in Leeds. I maintain that all municipalities should have the control of the gas and water works, and the profits accruing therefrom should go towards the reduction of the rates and improvement of the town or city, instead of going into the pockets of private individuals or dividend-seekers of the Livesey type. His quotations from the monthly periodical *Time*, and also from Thorne's speech at Plymouth, I pass over with this simple remark, that I am surprised Mr. Livesey should take notice of them.

I am pleased that the Leeds difficulty is amicably settled, thanks to the good sense of the Leeds Town Council and Messrs. Cockayne and Paylor, the District Secretary and Organizer respectively. It baulks Mr. Livesey once more, as I am informed that he and Messrs. Somerville and Carpenter were again recruiting blacklegs in anticipation of another struggle in Leeds; but they must not forget that the men of Leeds to-day are the same men who last July did and dared face both Carbineers and police to maintain their rights.

W. H. WARD, Assistant General Secretary,
National Union of Gas Workers.

Barking Road, E., Feb. 26, 1891.

The Dinsmore Process.

SIR,—There are one or two points in the "Correspondence," and your remarks relating to the subject of the collapse of the gas process in Liverpool bearing my name, upon which I wish to comment.

It is incontrovertible that the process tried at Liverpool was that of the Dinsmore Company; and while agreeing with you that the existence of a disagreement between myself and the Company does not concern others outside, it nevertheless is a matter of concern to others as well as to myself, as to what the process tried at the Liverpool works by the Company actually was.

That process was the invention of Mr. Carr, wherein an essential feature of what is rightly called the Dinsmore process is omitted—namely, the introduction and distillation of *liquid tar* in combination with the crude gas, in a duct or retort, at a temperature equal to that which produced the crude gas. Mr. Carr's process, tried at Liverpool and working at Widnes, is what has been called a "vapour process," no liquid tar being used. It depends for its efficacy solely upon the assumption that the tar in a superheated vaporous state is, on entering the duct, distilled and converted to permanent gas—an assumption entirely erroneous.

The slight gain effected by Mr. Carr's so-called vapour process is not yielded, as he supposes, by those tar vapours which, along with the crude gas at a high temperature, pass from the retorts through the duct. It is solely due to those imperfectly fixed and richer portions of he gas which immediately, and at too low a temperature, leave each retort when newly charged with green coal, and passing through the duct are, by its superior heat, rendered permanent. But the heat which is required to render those small portions of rich and cooler gas permanent has a deteriorating effect on the main body of the gas, which before entering has already become so much hotter that, with the superheating influence of the duct, a portion of the hydrocarbons are caused to be deposited therein; thus almost balancing the good results obtained from the fixing of the cooler and imperfect gas before mentioned. Hence the meagre results obtained at Liverpool by what was erroneously supposed to be the Dinsmore process.

Mr. Carr states that he had no concern with the recent trial of the process made by the Liverpool United Gas Company. This is not strictly correct, as I am authoritatively informed that the plant there erected and tried was practically identical—that is, brick for brick—with that erected and working according to his invention at Widnes.

I think it is of considerable moment to others to hear that the process invented by me—the Dinsmore process—will be shortly re-adopted; and that proof of all the good results which have been claimed for it will again be given.

As regards the results obtained by what is termed the "vapour process," its practical operation at several gas-works is in itself proof that by it improved results upon the ordinary method of gas making, under certain conditions, can be, and are undoubtedly made. But it is equally certain that they are incomparable with the marked and vast superiority of my liquid tar process.

In conclusion, let me thank you for your proffered kindness respecting the working of my process now about to be made.

Liverpool, Feb. 28, 1891. J. H. R. DINSMORE.

[There seems to be a "very pretty quarrel" between the various Dinsmore spokesmen, upon which we have no desire to adjudicate. It is, however, a pity that, while Mr. Dinsmore was writing, he did not state where and when the "marked and vast superiority" of his liquid tar process to what he describes as the "vapour process" invented by Mr. Isaac Carr has been demonstrated. He says, moreover, that proof of the good results of his process will "again" be given. What justification is there for the use of this word? We are under the impression that it is precisely this proof—in the form, say, proposed by Mr. W. A. Valon—for which the world has vainly waited so long.—ED. J. G. L.]

The "Cold Process" Gas Syndicate.

SIR,—Your issue of Feb. 17 contained a report on the above subject, which is not only erroneous, but from the beginning to the end is sneering and supercilious, without adducing a single fact to support such expressions. This is contrary to what I should have expected from a practical gas engineer and a gentleman representing your old-standing JOURNAL.

The "cold process" gas is the opposite to "hot process" gas made by retorts as used in coal-gas and oil-gas making. This new system is not in an ideal stage; it is, and has been, practically tested in use. The results produced by this process are, firstly, such as have not been attained before by any means of gas or electricity; and, secondly, they are attained with economy, and on a practical commercial basis. The effect is obtained by putting certain well-known laws into a practical form for daily use.

One of the favours I shall ask you, Sir, is to delegate some qualified public gas engineer, capable of testing the photometric and calorific power of the "cold process" gas, to report to a committee of gas engineers composed of such gentlemen as Mr. Trewby, Mr. George Livesey, Mr. T. Newbigging, and others. These gentlemen, before issuing their report, shall consider whether I am entitled to describe myself as a practical "engineer;" and further they shall examine me upon my knowledge of "hydrocarbons and their utilization."

I shall be quite satisfied with their verdict as an answer to the uncalled-for personal insult of your representative, who, speaking of me, writes "describes himself as an engineer and specialist for hydrocarbons utilization."

Trusting you will oblige by inserting this in your next issue,

JOHN W. STRINGFELLOW, Mechanical Engineer.

Wormwood Street, E.C., Feb. 27, 1891.

[Since the above is Mr. Stringfellow's idea of an answer to our remarks on his "cold process," we willingly give him the publicity he desires for it. At the same time, it is necessary to point out that this letter is open to the very reproach which the writer brings against our report—of not "adducing a single fact to support" the assertions advanced. It is made up of assertions, and of nothing else. When Mr. Stringfellow has furnished a few facts and figures relating to his "process," it will be quite soon enough to talk of testing them. No insult to Mr. Stringfellow was meant in giving his description in the terms which appear after his name on his own letter-paper. If a man can call himself anything he likes, within wide limits, he should surely not complain when attention is called to the description that he has selected.—ED. J. G. L.]

The Gaslight and Coke Company's Paint Contract.

SIR,—As the paragraph in the last issue of the JOURNAL, referring to the contract for the supply of metallic oxide paint to The Gaslight and Coke Company, somewhat discredits us, we ask you to be good enough to publish a copy of the enclosed letter accepting our tender. As we tendered for all colours, in the absence of any statement to the contrary we naturally expected the acceptance to be for all colours, and have yet to learn that this is not so.

Manchester, Feb. 27, 1891. DONALD MACPHERSON AND CO.

[ENCLOSURE.]

The Gaslight and Coke Company,
Horseferry Road, Westminster, S.W., Dec. 16, 1890.

Messrs. Donald Macpherson and Co.

Dear Sirs,—I have the pleasure to inform you that the Directors accept your tender, dated the 26th ult., for the supply to the Company's various stations of so much as may be required of your metallic oxide paint.

Yours faithfully,

(Signed) J. REESON, Assistant Secretary.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Thursday, Feb. 26.

The Bristol Gas Bill was referred to a Select Committee, consisting of the Earl of Aberdeen (Chairman), Earl Kingston, Lord Sinclair Lord Harlech, and Lord Cheylesmore; to meet on Tuesday, March 3.

The following progress was made with Private Bills last week:

Bill reported: Llanelly Local Board Water Bill.

Bill read the third time and passed: Llanelly Local Board Water Bill.

Bills withdrawn: Brentford Gas Bill; The Gaslight and Coke Company Bill.

A petition against the Bristol Gas Bill was presented from the Corporation of Bristol.

HOUSE OF COMMONS.

Tuesday, Feb. 24.

The Leighton Buzzard Gas Bill, the Bognor Water Bill, the Fylde Water Bill, the Market Drayton Water Bill, and the Sunderland and South Shields Water Bill were referred to a Select Committee, consisting of Mr. J. Lowther (Chairman), Viscount Weymouth, Mr. Allison, and Mr. Cremer; to meet on Tuesday, March 3.

The Garw and Ogmore Gas Bill, the Rhyl Gas Bill, the Stourbridge Gas Bill, the Stourbridge Improvement Commissioners' Bill, and the Western Valleys (Mon.) Water Bill, were referred to a Select Committee, consisting of Sir W. Houldsworth (Chairman), Sir C. Palmer, Mr. Knatchbull Hugessen, and Mr. Samuelson; to meet on Thursday, March 5.

THE RELATIONS OF CAPITAL AND LABOUR.

Mr. BECKETT asked the First Lord of the Treasury whether it wa true that Her Majesty's Government proposed to appoint a Royal Commission to inquire into the relations between employers and employed; and whether he could state what would be the scope of the inquiry, and the particular questions that would be submitted to the Commission.

Mr. W. H. SMITH: It is true that Her Majesty's Government intend to recommend the appointment of a Royal Commission, with the object generally stated by my honourable friend. I shall be prepared in the course of a few days to announce to the House the terms of the reference to the Royal Commission; but I may say generally that the object we have in view is to institute an independent and careful inquiry into the causes of the differences between employers and employed which have produced such painful results during the past year, and also to inquire whether it is desirable or possible to introduce legislation on the subject.

Mr. BECKETT said the action of the Government had rather forestalled him; and therefore he would not move the resolution of which he had given notice (*ante*, p. 202), to the effect that a Standing Committee, representative of capital and labour, should be appointed by the Board of Trade.

The following progress was made with Private Bills last week:

Further Standing Orders complied with: Bognor Water Bill.

Petitions against the following Bills were presented:

London Water (Meter) Bill, from the New River Company.

Metropolis Water Supply Bill, from West Ham.

Metropolitan Water Companies' Charges Bill, from the New River Company.

Nelson Corporation Bill, from the Padiham and Hapton Local Board, and others.

Stourbridge Improvement Commissioners' Bill, from the Stourbridge Gas Company.

Western Valleys (Mon.) Water Bill, from the Monmouthshire County Council, and others.

Sales of Shares.—Last Tuesday at Durham, at a sale by auction, a number of gas and water shares were disposed of. Three £5 "B" shares in the *Hartlepool Gas and Water Company* were sold at £8 15s. each; seven £5 "C" shares fetched £8 7s. 6d. apiece; and two £10 "D" shares realized £16 each. Four £25 (1866) shares in the *Weardale and Shildon Water Company* produced £29 2s. 6d. each; and six £25 (1875) shares realized £39 7s. 6d. per share. Eighteen £5 (1873) shares in the *Consett Water-Works Company* sold at £9 2s. 6d. each; and five similar shares at £9. Eight £5 (1875) shares in the same Company realized £9 2s. 6d. apiece——At Scarborough last Friday week, Messrs. Pirie and Orr sold by auction stock in the *Scarborough Gas Company*, of the value of nearly £3500, at the following rates: 5 per cent. preference, at £124 and £124½ per cent.; allotments of new stock, (£60 paid), £97 and £97½ per cent.; original 10 per cent. stock, at £207½ per cent.; consolidated (new 7 per cent.) stock, at £152 per cent.; and ordinary 7 per cent. stock, at £151 and £152 per cent.

MISCELLANEOUS NEWS.

METROPOLIS GAS SUPPLY.

Recent Appeals to the Chief Gas Examiner.

Reference has been made in the JOURNAL on several occasions to the trouble which the London Gas Companies have lately experienced in connection with the official testing of their gas. In December, 1889, The Gaslight and Coke Company appealed to the Chief Gas Examiner (Dr. A. W. Williamson, F.R.S.) on two occasions in respect of returns of deficient illuminating power; and the matter was specially investigated and reported upon by him. On the first occasion, the complaint was as to the gas at the Hornsey Road testing-station on the 2nd of the month, upon which Dr. Williamson reported on Nov. 11 last year as follows:—

At the hearing which I gave to the parties, Mr. Trewby, the Chief Engineer of the Company, appeared for the Company; Mr. Dibdin, the Chemist of the County Council, appearing for that body.

It was urged on behalf of the Company, that the tests of illuminating power were invalid, because the instructions given in the Act governing the testing were not complied with. It appears that the Company expressed a wish to be represented by an officer at the testings at Hornsey Road on the 2nd of December; and that thereupon the Gas Examiner stated to the Company's representative the times at which he proposed to test the gas on the 2nd of December—viz., at 9 a.m., at 5.30 p.m., and the third test at an hour's interval from the second. Having performed the first test in the presence of the Company's representative, and obtained very low readings of the illuminating power, he informed the Company's representative that he proposed to perform the remaining tests at hour's intervals after the first test, instead of performing them at the times which he had at first proposed. He accordingly so performed the tests in the presence of the Company's representative.

The Company urged that the Gas Examiner was bound to keep to the times of testing originally proposed; and they considered themselves aggrieved by the circumstance that, by changing the times of the later tests, he gave them no opportunity of bringing up the illuminating power in time for those later tests. It appears from the statements of the Company's officers that there are nine gasholders at the Bromley works, containing more than one quality of gas, and that each of them can, at the Company's pleasure, supply gas to the main which leads to the Hornsey Road testing-place; so that the Company could turn more of the better gas on to the testing-place, or they could increase the illuminating power of the make in the retorts. The Gas Act lays down that the purpose of the Gas Examiner's tests is to ascertain whether the gas supplied by the Company at his testing-place is of statutory illuminating power, &c., during the whole of each day. The Gas Examiner stated that he changed the times originally proposed for the later tests because he considered that it was his duty to ascertain whether the first test was a purely accidental low test, or whether the gas was deficient in illuminating power. The average of the tests which the Gas Examiner made during the morning proved that the gas delivered by the Company at the testing-place during that part of the day was deficient in illuminating power. If the Gas Examiner had not acted as he did, the deficient illuminating power of the morning gas would not have been ascertained. There is no proof of any failure on the part of the Gas Examiner to comply with the instructions given in the Act governing the testing.

It appears to me that the presence, or intended presence, of an officer of the Company, at the official testings ought not to interfere in any way with the Gas Examiner's discretion in changing the times of his tests when he considers that the efficient discharge of his duty under the Act necessitates such change—provided that the Gas Examiner notify to the representative of the Company the changes of time which he proposes to make.

It was argued, on behalf of the Company, that, inasmuch as the tests were made on a Monday morning, the gas must have suffered deterioration by remaining longer than usual in the main, owing to the small consumption on Sunday; also that, whereas the average temperature on Saturday was 40° Fahr., and had fallen on the day of the tests to 33° Fahr., the gas must have been affected by the fall of temperature. Each of these circumstances may be expected to have exerted some influence on the quality of the gas; but they are of very common occurrence in winter, whereas so low an illuminating power as was found in the gas on the 2nd of December is exceedingly rare.

The Gas Examiner's test must accordingly be accepted.

On the second occasion, the complaint was with respect to the illuminating power of the gas at the Camden Street testing-place on the 6th of December, 1889. On this Dr. Williamson reported on Nov. 13 last year as follows:—

At the hearing which I gave to the parties, Mr. Trewby, the Chief Engineer of the Company, appeared for the Company; Mr. Dibdin, the Chemist of the County Council, appearing for the Council.

It was stated that the mean atmospheric temperature on the day preceding the test was 34° Fahr., and the minimum temperature 31° Fahr., whereas on the day of the test the mean and the minimum temperatures were 3° higher.

The Company argued that, inasmuch as the official test showed a considerably lower illuminating power in the gas which was delivered at the testing place than the average of the gas sent out in the course of the day by the Company, and that inasmuch as the cooling of gas causes, under such circumstances, a diminution of its illuminating power through the deposition of some of the more valuable constituents of the gas, the deficient illuminating power was probably caused by the low temperature which prevailed on that day. The main and service pipes through which they supply the gas to the testing-place were covered with a sufficient depth of earth to protect considerably the gas passing through them from the effects of any sudden and short change of temperature; and it does not appear to me to be probable that the average atmospheric temperature, or the lowest which prevailed on the day of the tests, could account for a diminution of illuminating power from the average quality quoted by the Company for their day's gas to the value found at the testing-place.

The Company state that it is quite possible for them to supply gas at low temperatures, and to comply with the statutory requirements at low temperatures. Moreover, it was pointed out quite frankly by an officer of the Company that on a subsequent day (Dec. 19) the prevailing temperature was several degrees below that of the 5th, yet the gas at the testing place was found to have an illuminating power of 16·3 candles.

I do not consider that the Company has shown that the insufficient illuminating power of the gas at the Camden Street testing-place on the 5th of December was occasioned by an unavoidable cause or accident.

THE PROFIT-SHARING SCHEME OF THE SOUTH METROPOLITAN GAS COMPANY.

It is specified in the rules under which the profit-sharing scheme of the South Metropolitan Gas Company is managed, that the Committee are to meet not less than twice a year—in the months of February and August—to consider the progress of the scheme, upon which a report is to be presented by the Secretary. A meeting was accordingly held last month, when Mr. H. C. Sims, who has undertaken the secretarial duties, submitted a statement of which we give a summary.

In the original offer of the profit-sharing system, it was stated that as soon as possible a Committee, to be composed of equal numbers of workmen selected by themselves, and officers chosen by the Directors, presided over by the Chairman of the Company, was to be formed to settle all details. The profit-sharing workmen accordingly elected 17 of their number by ballot as their representatives—being in the proportion of one per cent. The Committee having been constituted, the first meeting took place on the 21st of May last, when a Sub-Committee was appointed, consisting of four officers and four workmen and the Chairman, to draft a set of rules to be submitted to the full Committee for their consideration and adoption if approved by them. The workmen members of the Committee stated that they were authorized to say it was the general wish of their fellow-workmen that the "nest-egg" should remain in the Company's hands for the full term of five years; and this was carried unanimously—only the representatives of the men voting. The Sub-Committee met on May 30; and on June 18, at a full meeting of the Committee, the rules now in existence were finally adopted, having been submitted to Mr. J. C. Washington, Solicitor, and approved by Mr. Mark Knowles, Barrister-at-Law.

The workmen's representatives having held two meetings to consider what matters should be brought forward at the first meeting of the full Committee, submitted the following four requests: (1) "That the Directors be respectfully asked to revert to the former rule with regard to payment to men when on the sick fund." This was agreed to, with the addition that members would also be entitled, on the expiration of the limit of three months, to a further benefit of 6s. per week for an additional three months. Those who subscribed 6d. a week would get 9s. per week for the extra period. (2) "That the Directors be respectfully asked to allow a man to retire on his superannuation when he has served the Company 20 years, and has attained the age of 55 years." The Chairman explained that this must be submitted to an actuary. The following statement by Mr. J. Whitcher, Actuary to the London Life Association, was submitted; showing the amount of pension that may be obtained through this fund at the weekly subscription of 3d., with the additional 40 per cent. added by the Company, invested at 4 per cent.:—

Age at Entry.	25 Years' Service.		30 Years' Service.		35 Years' Service.		40 Years' Service.		45 Years' Service.	
	Per Ann.	Per Week.	Per Ann.	Per Week.	Per Ann.	Per Week.	Per Ann.	Per Week.	Per Ann.	Per Week
	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	s. d.
20	..	..	..	..	7 18 9	3 0½	13 5 6	5 1½	23 16 9	9 2
25	..	..	5 17 3	2 3	9 19 0	3 10	18 0 10	6 11½	..	..
30	4 4 4	1 7½	7 6 3	2 10	13 8 9	5 2	..	..	..	..
35	5 4 6	2 0	9 15 11	3 9	..	..	..	..	..	..
40	6 18 7	2 8	..	..	..	..	..	..	..	..

After discussion, this matter was left in the hands of the Directors. (3) "That the bonus under the profit-sharing scheme be drawn annually; that the 'nest-egg' be left to the discretion and judgment of the full Committee, as stated in the report of speech of G. Livesey, Esq., at the meeting held at Old Kent Road, Nov. 21, 1889." This was agreed to as to the bonus; but, at the request of the representatives of the men (they alone voting), it was decided that the "nest-egg" should be left in for five years. (4) "That the Directors be asked to allow the workmen to have their gas at the reduced rate." This was agreed to.

In order to express their appreciation of the profit-sharing scheme, the employees from all the stations invited the Directors and officers to meet the workmen and their wives, to the number of about 2000, on the cricket field at the Old Kent Road station, on Saturday, the 26th of July last, when a resolution was unanimously adopted, with great enthusiasm, thanking the Chairman and Directors for the very liberal and satisfactory way in which they had concede d the scheme, and for the courteous manner in which they had received the men on all occasions; and the hope was expressed that the friendship then existing might long continue—adding to the prosperity both of the Company and its employees. This was followed by an equally enthusiastic and even larger meeting in the same place on the 20th of September, to present to the Directors the illuminated resolution passed at the previous meeting, and albums, containing portraits of the Directors and officers and members of the Committee, to the Board, to each

Director, and to Mrs. George Livesey, Mrs. Frank Livesey, and Mrs. Bush. Both of these meetings were the entirely free and spontaneous acts of the workmen themselves.

The profit-sharing proposal was introduced on Nov. 6, 1889, and before the end of the month nearly every free man, and some others, had voluntarily accepted it—about 1000 in number signing the agreements. At the beginning of 1890, after the strike, a large number of new men also signed agreements. The original agreements, which were for a period of twelve months, have all expired, and have been again voluntarily renewed; and at the end of last year practically all the regular employees of the Company, to the number of 2078, were working under profit-sharing agreements—the periods ranging from three to twelve months.

The accounts show that the "nest-egg," together with interest, amounted to £7060 13s. 10d. on the 30th of June last. Since then there has been paid, in consequence of death, superannuation, and leaving the Company's service, to 28 workmen, a total amount of £209 5s. 11d.; leaving £6851 9s. 11d. as the total amount of the "nest-egg" on the 31st of December last. The bonus for the past twelve months, put to the credit of profit-sharing men on June 30, 1890, amounted to £6036 19s. 3d. Of this amount £3533 18s. 5d. has been withdrawn; leaving £2503 0s. 10d. in the Company's hands. The men's savings, deposited with the Company at 4 per cent. interest, amounted up to the 15th of December to £2778 5s. 1d.; making altogether a total to the credit of the workmen of £12,132 15s. 10d. In addition to this amount, a number of workmen have become shareholders of the Company; having invested £1657 14s. in the "C" stock, which pays 5 per cent. interest on their investment. Arrangements have been made whereby at any time workmen wishing to purchase or sell stock can do so at the market price, on application to the Secretary; the only expense incidental to the transaction being the Government stamp duty. The smallest amount of stock which can be purchased is £5. To encourage the habit of thrift, arrangements have been made for taking, as savings, sums varying from 1s. and upwards, by a system of tickets obtainable at the pay-table every week. In every case the strictest confidence is maintained; only the officers keeping the books having any knowledge as to the savings of any individual.

The report deals with the effect of the price of gas on the men's bonuses. It states that, so far, notwithstanding the great increase in the cost of coal, the Company have been able, by drawing somewhat heavily on the reserve fund, to continue to sell gas at 2s. 3d. per 1000 feet, which, under the profit-sharing scheme, entitles the workmen to a bonus of 5 per cent. on their wages. In this connection, the Chairman thinks it only fair to state that the cheerfulness and goodwill with which the men as a body do their work have given the Directors great encouragement, which acts as a strong inducement to them to avoid any increase of price and consequent reduction of the bonus to be paid to the men. It will be remembered that it was stated, in certain quarters, when the scheme was first proposed, that with the increase in the price of coal and other materials, and the rise of wages, the Company would raise the price of gas to the point at which there would be no bonus at all. This prophecy has not yet been fulfilled. The price of gas has for three half years since the scheme was started been maintained at 2s. 3d. per 1000 cubic feet without any increase; and another half year at the same rate has been started. But it is pointed out that it rests to a considerable extent with the men themselves whether the charge is to remain at its present figure. Coals are falling in price, but they are still very high; and to enable the Company to tide over the period of difficulty, it is necessary that all concerned in the working of the undertaking—from the Directors down to the humblest labourers—should take an intelligent interest in their duties. The Directors neither expect nor wish that any man should do more than his fair share; but they do expect that every man will do his duty, and take care that neither time nor materials are wasted. So far the profit-sharing has, the report says, been a great success. It has brought employers and employed into friendly contact; and it has produced a feeling of mutual confidence and good-will that must be beneficial to all.

The Supply of Gas for Cooking and Heating Purposes at Bingley.—The Bingley Improvement Commissioners, having reduced the price of gas used for cooking and heating to 2s. 6d. net per 1000 cubic feet, have decided to abolish the rent of the special meters employed to register the supply; and with the further desire to stimulate the consumption of gas for other than lighting purposes, they let out cookers at the nominal fee of 2½ per cent. per annum on the cost of the appliances and the fittings. As the smallest sizes of cookers are to be obtained at the rate of ½d. per week, their greatly extended use ought to follow the liberal policy of the Commissioners.

The Borrowing Powers and Reserve Fund of the Leicester Corporation Gas Department.—At a special meeting of the Leicester County Council last Tuesday, the Gas Committee reported that, in accordance with a resolution of the Council, passed on Nov. 25 last, an application was duly made to the Local Government Board to alter or amend the Leicester Corporation Gas and Water Transfer Act, 1878, so as to enable the Corporation to borrow, for the purposes of the gas undertaking, an additional sum of £100,000, and to increase the gas reserve fund to £50,000. Some correspondence had taken place with the Local Government Board on the subject; and, in order to meet a preliminary requirement of the Board, the Committee recommended the Council to assent to an amendment of the Local Act of 1884, by the insertion in the contemplated Provisional Order of a clause repealing the powers of the Corporation to issue irredeemable stock, and to invest the loan fund in statutory securities of the Corporation, so far as such powers would affect the moneys to be raised under the proposed Order and the repayment thereof; also to direct application to be made for a further amendment of section 36 of the Act of 1878, so as to provide for the investment and accumulation at interest of the proposed increased gas reserve fund in statutory securities other than those of the Corporation, and the application of gas revenue in payment of interest and capital in respect of moneys borrowed for gas purposes other than under that Act. The report was adopted.

THE LEEDS CORPORATION GAS COMMITTEE AND THEIR MEN.

The Dispute Settled.

An amicable settlement of the matter in dispute between the Leeds Corporation Gas Committee and their men has been arrived at; and the arrangement they entered into as the result of the conferences they held, was confirmed by the Council last Wednesday. The steps which led up to this result may be briefly recorded. The conference, as we intimated last Tuesday, opened on the previous Saturday, and was adjourned to the Monday evening. The deliberations on this occasion took a more practical shape than characterized the previous conference. The proceedings commenced by Mr. Paylor reading a statement, in which the deputation said that they had reported to the men the result of the interview on Saturday. It appeared that the Committee, or some members of it, first wished to reconsider all the rules, but that afterwards the discussion centred on Rule 2. On this rule suggestions were thrown out to the effect (1) that the stokers were not at present carbonizing 3 tons per shift; (2) that it is impracticable to weigh out the coal as directed by Rule 2; and (3) that the coal should be measured in boxes, the capacity of which should be tested and approved by the Union officials as well as by the Gas Committee officials. These suggestions were carefully and exhaustively discussed by the men; but owing to the vagueness of them, no definite decision was arrived at. In order to assist the Committee, however, the deputation stated their views on the three points. On the first, the men replied that they were filling all the retorts in a proper manner; and, to the best of their judgment and ability, they were carbonizing the full 3 tons per shift. On the second point, the men admitted that some trouble and expense would be required to weigh out the coal; but the provision that it should be weighed was put in at the request of the Committee, and at the time the Union officials pointed out this difficulty. On the third point, the deputation said that the suggestion that the coal should be measured required very careful consideration; and they feared that the Gas Committee misunderstood the practical difficulties of measuring even more seriously than they misunderstood the practical difficulties of weighing. They again urged upon the Committee to accept the proposal contained in their letter to the Mayor, which was read at the Council meeting reported in the JOURNAL last week. As some misconception still seemed to exist upon the question which gave rise to the present dispute, the deputation pointed out that Rule 10 defined the number of days' notice (28) the men should give or receive under ordinary circumstances, and the number of days' notice (14) a stoker shall receive under the special circumstances of being discharged because his labour was no longer necessary in consequence of a bed of retorts at which he had been working being put down. The question which gave rise to the present dispute was the mode of selecting for dismissal the particular men to be dispensed with when a bed of retorts had to be put down. Upon this point, they said, all the rules were absolutely silent; and the question, it was maintained, was purely one of custom. This statement was followed by a long discussion, in the course of which Alderman Harrison moved the following addition to Rule 10: "This rule, however, which in the case of putting down a bed of retorts shall apply not only to stokers but also to firemen and coal-wheelers, is not intended to affect the previous custom that, so far as practicable, the summer hands shall be continued in preference to the winter hands; and, in order to carry out this custom, fourteen days' notice may be given to winter hands working other retorts not being put down. Neither this rule nor any other shall curtail the right of the Managers as to the general management of the several works, including the engagement or dismissal of workmen according to law." An amendment was moved by Mr. Ambler to the effect that the men who had received notices from the Corporation, and whose notices had expired, be dismissed; that the whole of the notices given on Feb. 11 be accepted; and that the Managers be instructed to take on such men as they might think best, having a proper regard for the old hands and custom that was said to have hitherto prevailed; the old hands, so far as the Managers should consider fit, to have the preference. Also that the men be given a month's notice to consider the alteration of the rules, with the view to modifying Rules 2 and 10 so as to secure the carbonizing of 60 cwt. of coal, and as to the notices to be given. This amendment, however, was defeated; and Alderman Harrison's resolution was adopted by seven votes to six. The result of the discussion was communicated to the men, who held a meeting on Tuesday morning, and after some discussion, though no formal resolution was passed, the deputation was instructed to inform the Committee that the men considered the wording of the resolution rather vague, and to ask that the word "may," as applied to the giving of fourteen days' notice should be "shall." The same morning the Committee held a further meeting, at which Alderman Harrison explained that his only object in moving the resolution was that the old custom as to the dismissal of hands should be reverted to, and carried out in its entirety. This, Mr. Cockayne pointed out, was all that the men were contending for; and the deputation then left the Committee to consider this point. The men were again called in; and after a little more discussion, they agreed to the original wording of the resolution. This, as reported below, came before the Council on the following day for confirmation.

The Proceedings at the Council Meeting.

The Adjourned Meeting of the Council was held on Wednesday—the MAYOR (Mr. Alfred Cooke) presiding—for the purpose of hearing the result of the conferences between the parties concerned in the dispute.

At the commencement of the proceedings there was some discussion as to whether the Committee's resolution should alone be considered, or whether the whole question should be gone into; and on the matter being put to the vote, there was a majority of two in favour of the latter course.

Alderman GILSTON then moved that the resolution as set forth above should be adopted. In defending the action of the Committee, he said that in July last rules were come to as the result of a definite

arrangement between the Committee and the men, which were printed and certified by the signatures of himself and representatives of the men, in the presence of Sir George Morrison. Therefore whatever custom might have previously existed, the Managers at the gas-works could not exceed their duty in carrying out the rules. He did not understand that the men ever questioned the correctness of this position. The men, however, justified the position they had taken up by a statement which was not true, that on the signing of the rules, he, having in view Rule 10, gave an undertaking that all past customs should be observed. He had told the Committee that he had no recollection of having done anything of the kind; and Sir George Morrison, he was given to understand, had no recollection of such a thing having taken place. But he had a distinct remembrance of one of the men saying that there should be a clause put at the end of the rules that no advantage should be taken of any man in consequence of conduct in the strike, or in the previous October. He asked, "Have we ever taken advantage of you?" and the men replied "No." He (Alderman Gilston) added, "Well, if there is a man about the place that ought to have been taken advantage of, it is you; and inasmuch as no advantage has been taken of you, it is hardly likely we should be desirous of anybody else; and therefore I'll give you my undertaking, on behalf of the Committee, that no advantage shall be taken of any man in consequence of the part he has taken in this strike." This undertaking had not been violated. Rule 10 stated that a stoker must have 28 days' notice to leave, unless a bed of retorts was to be put down, and then service might be terminated by 14 days' notice. The Manager at New Wortley wished to let down a bed of retorts which could not be continued in the interests of the ratepayers; and it rested with him alone to whom notices should be given, and they were given to men working at one bed. But it was said that the Committee had done this, and done it through vindictiveness. When the notice was given, he personally did not know a single man employed in the retort-house in question; and he did not believe that any member of the Committee knew two of the men. Another charge was that the men to whom notice was given had been gathered into this particular retort-house so that vengeance might be wreaked on them. The bulk of the men went into the house at the termination of the strike last July; and no man had been taken from any other house and put into it. It was entirely wrong to say that any advantage had been attempted to be taken of the Union, since every stoker belonged to the Union. As to the promise of old customs being adhered to, if the Council could not take his word they might ask Sir George Morrison, or Mr. Lupton, the Secretary of the Gas Committee, if their recollection differed from his own. Since July everything in the works had not gone on as pleasantly as could have been wished; influences having been at work not for the good of the undertaking, nor to the peace and advantage of the men. Rule 2, perhaps as indefinite as Rule 10, was agreed upon last July. It provided that each stoker should carbonize 60 cwt. of coal per day, for which he should receive 5s., or 1d. per cwt. On that occasion he thought to protect the Corporation by putting into the rule the term "weighed." They had never weighed coal before. Past custom said that 55 cwt. on paper amounted in practice to 51 cwt. But despite Rule 2, old customs had since been carried on. For the six months ending Dec. 31 the men had carbonized 55 cwt., instead of 60 cwt.; and every man had obtained 5s. for doing 4s. 7d. worth of work. It was said the Managers were to blame. The Managers had tried every possible way other than weighing to get the proper quantity carbonized. But the men had interposed obstacles; and to weigh the coal would have cost more than to have left things as they were. They were not disposed to spend 6d. in order to save 5d. In the absence of weighing-machines, it was tried at Meadow Lane to measure the coal by means of boxes—not an accurate measure, but an approximation—and yet the boxes had to be thrown on one side, as the men refused to use them. Monthly returns as to the carbonization of coal had been presented; and thus since July, if the Committee had been determined to enforce the rules as laid down, apart from Rule 10, a difficulty could have been raised at any time, but they had not sought to complicate matters since the rule said that the coal must be weighed. Mr. Ambler was right when, at the last meeting, he said they had paid for 10,000 tons of coal which had not been carbonized; but the figures were 10,050. This matter applied to the stokers who carbonized the coal, the wheelers who wheeled it, and the firemen. Then there was talk about vindictiveness. The Manager at New Wortley had to get rid of 66 men owing to the letting down of a bed of retorts; and he put a rule agreed upon into operation. This procedure affected two men who, because they acted with the Committee at the last strike, had to be under police protection; and yet they had to go as well as the other 64 men. It might be said that the Committee had made a complete surrender. Well, if making a complete surrender would make a rule intelligible and workable, he was prepared to make it. Rule 10 was not workable, and they had now so altered it as to make it workable if possible. The Committee had no desire to be unjust to the old hands; and so far as preference was concerned, other things being equal, they should have it, and a little bit of favour besides. But there was one custom the Committee would not depart from, and that was they would manage their own business.

Mr. HARLAND asked whether the rule was intended to apply to the men under notice.

Alderman GILSTON said it applied to every man in the Committee's employ at present.

Mr. HUNT seconded the motion.

Mr. PICKERSGILL asked Sir George Morrison whether he remembered ever hearing Alderman Gilston say anything about custom in this matter.

The TOWN CLERK said that he went to the Municipal Buildings to attest the agreement that was drawn up between the Gas Committee and the men. He read the clauses through aloud, and asked if everything was included. He was assured that this was the case, and had no recollection whatever of any mention being made of custom. If there had been, it would have struck him, as he would have had to point out that it was contrary to law, which did not allow a written contract to be varied by custom.

Mr. BATTLE suggested the following additions to the resolution: (1) That some practical method of fixing and measuring the men's work be laid down; (2) that the custom now, or lately, in dispute be abolished as a custom, and laid down in an accurately worded rule. Unless something of this sort were done, he said, they would have difficulties continually cropping up, and in the end would have to get Messrs. Cockayne, Paylor, and M'Guire to become honorary members of the Gas Committee.

Mr. LOWDEN said he failed to see why there should be a desire to do away with the custom, as he did not think it would be of any advantage to the ratepayers. They were told that the men wished to acquire a vested interest in the works; but really they sought no more than they had possessed in the past.

Mr. TEALE thought that the introduction of Rule 2 into the dispute was a mistake. The men, he considered, had acted unfairly to the New Wortley Committee; and instead of anything being said against the Manager, they ought to recognize that he had acted according to his best judgment. They ought not to leave him when he required and deserved the support of the Committee.

Alderman HARRISON considered the whole of the dispute a veritable storm in a teacup. (Hear, hear.) If any charge was made against him of vindictiveness, he should not answer it; if his reputation were not a sufficient answer to such a charge, he should never stoop to reply. It was due to the forbearance and consideration of the Gas Committee much more than of the men that they were now in a position to submit to the Council a resolution which he believed would provide an equitable settlement of the difficulty. The men said they were prepared to carbonize 60 cwt. of coal; and he believed them. The obligation on the part of the Committee was to weigh it for them. At the time the Committee entered into the obligation, they knew there would be a difficulty about it; and the difficulty had not been met. When the men and the Committee came together to negotiate upon this particular point, he had no doubt they would be able to hit upon some mode which would be satisfactory to both parties; and 60 cwt. would be carbonized. With regard to the custom, the Committee did not know of any such thing; and it was the fault of the men that it was not put into the rules. It was an omission for which the men were to blame, and not the Committee. The proper thing to do was to put it into the rule now—the first time that the question had arisen.

Mr. HARLAND said that had he seen the men's representatives when the existing rules were ageed to, he should have left the room upon their settlement, with the assurance that the old customs were to be preserved. As to the weighing of the coal, he thought machines should have been provided. He would have the Corporation do their duty, and the men theirs.

Mr. WILSON considered that Messrs. Cockayne and Paylor had conducted the negotiations in a straight and creditable manner. Evidence that the Committee had a weak case was shown by the introduction of matters foreign to Rule 10.

Other members having spoken,

Mr. HENRY said that the Committee had met the men fairly. If the men had a grievance, they should have waited upon the Manager. But they neither approached him, nor the Works Committee, nor the Chairman of the Works Committee; and it was not known such a grievance existed until it had been published in a local paper. If that was the spirit in which the Committee were to be met, it would be an utter impossibility for business to be conducted. Public opinion, he believed, was against the men. If the Council refused to pass the resolution, the men would not strike. They were only playing the game of brag; and the Council were submitting quietly to it. If their Managers were not to have control, the works would get into difficulty. The Committee voted unanimously in favour of supporting the Manager, and why a change should occur he did not know.

Alderman GILSTON, in replying, said that the resolution would form a basis for a truce, when all the rules would be discussed. He hoped that Mr. Battle would not press his addenda, but leave it to the Committee when they came to discuss the rules with the men. Incompetent as they were, and inefficient as was their management, the return for the past twelve months showed better results from every ton of coal carbonized than they had ever had before; and the year was the most successful they had had since the Corporation acquired the gas-works.

The resolution was adopted, with four dissentients.

Reported Discovery of Natural Gas in Montreal.—The Montreal Gas Company have been engaged for some weeks past in boring an artesian well on their property in Hochelaga. When they had reached a depth of 700 feet, they are reported to have struck natural gas.

Sinking for Water near Piccadilly.—Recently the St. James's and Pall Mall Electric Light Company made a boring for water in Mason's Yard, Jermyn Street, with the result that at 260 feet it was obtained; the yield being 2000 gallons per hour. It is now equal, it is stated, to 7000 an hour, or over 1,000,000 gallons per week—a substantial addition to the water supply of the parish. According to the London Correspondent of the *Manchester Guardian*, the water is of first-rate quality. As the parish authorities are making a large addition to their baths and washhouses, it is proposed to carry out a similar experiment close to the site of the baths. If sufficient water is forthcoming, it will afterwards be utilized to water the streets.

Opposition to the Sunderland and South Shields Water Bill.—A Special Committee of the Sunderland Town Council recommended that body last Wednesday to take the necessary steps to oppose the Bill now being promoted in Parliament by the Sunderland and South Shields Water Company. Alderman Robson stated that in 1866, the Company charged the Corporation 4d. per 1000 gallons for water; and in 1876 they raised the charge to 6d. per 1000 gallons, and had gone on increasing it until at last they were paying 8½d. The Corporation had been treated in the same way as private consumers, although they used such a great quantity of water. The Company had made reductions which would amount to about £545 a year; but that was not considered sufficient. The report was adopted.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Guildhall Tavern, Gresham Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY (Mr. Alfred Lass, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts, some particulars from which were given in the JOURNAL last week (p. 356), were taken as read.

The CHAIRMAN said that the report was of such a nature that he had no doubt every one of the shareholders was pleased with the results. In both divisions of their concern, the outcome of the half-year's working was satisfactory. The quantity of gas made in the six months was 2,900,000 cubic feet more than in the corresponding period of the previous year; and the amount of gas sold had increased by rather more than 3 millions. This was equal to 9½ per cent.; and a great deal of it was due to the very cold weather in December, in which month the temperature was lower than in any year since 1788. The weather was so severe, and the amount of gas consumed was so large, that every retort at their works was in full action. As the shareholders were aware, the gas plant was old, and required renewing; and their Engineer (Mr. T. H. Martin) was consequently at the time put upon his mettle to maintain a proper supply. This, however, he did; and, moreover, during the coldest portion of the winter, by introducing steam into the purifiers, he kept them in working order, and was able to send out gas as pure as at any other time of the year. There was another phase of this, however, that to him, as an old man, was exceedingly pleasing. When he was a young man, there was much more kindly feeling between employer and employed than existed at the present time. But during the recent severe weather, their workmen saw that the Engineer was in a difficult position; and they all aided him to the utmost of their power. He had been interested to know how the 9½ per cent. increase in consumption of gas in the half year was produced. If it had been obtained in the cold period alone, it would have been abnormal. But he found that in July the increase exceeded 7 per cent.; and it was the same in August and September. In October it was only 3 per cent. But in every month they had an increase of business over the corresponding one of 1889; and this held out to him the hope that it was normal, and would continue. The Directors had the pleasure on this occasion of recommending a dividend of 8 per cent.; and he thought they were doing this upon a safe foundation. The difficulties they were placed in during the past winter showed very clearly that they must have more gas-producing power to meet the demands of their customers; and before the next winter they would have a new retort-house (which was now being built) ready for work. With regard to the water portion of the concern, it was unnecessary to say anything, as it would only be a repetition of what he had said at the meetings during the past two or three years. It was progressing very satisfactorily; so that on both sides of their business they were doing well. He concluded by moving the adoption of the report and accounts.

Mr. C. HORSLEY, J.P., seconded the motion.

Mr. G. ANDERSON said he was very pleased to see that the concern was much more profitable than a year ago. In the gas revenue account, he observed that they had increased by something like £1000; and in the water account they had exceeded former times by about £369. This, he considered, was partly due to the good working of their Engineer. The residuals had returned them 62 per cent. of the cost of the coal; and this was more than they had ever obtained before. For their sulphate they had received 11d. per ton of coal carbonized; and this was a very fair return for that article. On all these points he had to commend the Board; but there was one matter to which he had referred on previous occasions, but which was not mentioned either in the speech of the Chairman or in the report. He alluded to the supply of gas during the daytime for motive power and other purposes at a lower price than was charged to consumers for gas used for ordinary lighting. At one or two of his works he found this answered well. In the case of one works, he had sold a million cubic feet of gas more than he should otherwise have done. From sunrise to sunset their mains were lying partially idle; and if they could then do business through those mains at a small profit, he maintained it would be to the interest of the Company to do it. He did not know of anything against this system of charging different prices. He had worked it for about a couple of years; and he was pleased with the result, and intended to continue it. Mr. Anderson proceeded to speak of the remuneration of the Auditors. He did not think that the ten guineas that they each received every half year was adequate payment for auditing the accounts of both the gas and water undertakings; and he thought if they were given 25 guineas each, it would not be too much.

Mr. WAKEFIELD congratulated the Directors on being in a position to pay the shareholders an increased dividend. The dividend was a matter upon which he had spoken on several occasions; and it was very pleasing to learn that at last they were able to advance it. He went on to direct attention to "the very great strides that the electric light is making," and stated that, if the Directors at any time thought fit to make an experiment in electric lighting with fresh capital and the present shareholders, or by starting a small Company specially for the purpose, he would be inclined to risk it, and should be glad to spend £200 in that way. He mentioned that he was connected with a Company who went in for electric lighting, and whose £12 shares were now worth £45.

The CHAIRMAN, in reply, said the question of charging a different price for gas consumed in the daytime had been before the Board; but they did not see their way clearly to adopt the system with profit. However, he might say that their mains did not lie idle in the daytime. They had held an exhibition of cooking and heating stoves in Barnet, with very good results; and he believed that they would extend their business in this direction. He might mention that they were going to improve the whole of the gas-works, and thousands of pounds would have to be spent on them; and at the same time the sulphate plant would no doubt receive consideration. His colleagues and himself were all very attentive to the question of electricity; but up to the present he had never heard of a really profitable installation of electric lighting.

The motion was unanimously carried.

On the motion of the CHAIRMAN, seconded by Mr. HORSLEY, dividends for the half year were declared (less income-tax) at the rate of 8 per cent. per annum on the "A" and "C" stocks, 7 per cent. on the "B" stock, and £5 12s. per cent. on the "D" (water) shares.

Mr. HORSLEY moved, and Mr. A. H. BAYNES seconded, the re-election of the Chairman and Mr. W. Joslin, who were the Directors retiring by rotation; and the motion was carried.

On the proposition of Mr. LARKING, seconded by Mr. JAMES RANDALL, the retiring Auditor (Mr. A. G. Hounsham) was re-appointed.

Mr. DYER then moved that the remuneration of the Directors be increased by £100 per annum. He remarked that the Directors' fees had not been raised since they first paid a dividend of 7 per cent. in 1883; and it was, he believed, then understood there should be another increase when they gave the shareholders a further 1 per cent.

Mr. CECIL seconded the motion, which was unanimously carried.

Mr. ANDERSON next proposed, the CHAIRMAN seconded, and it was agreed, that the Auditors' fees should be raised to 25 guineas each per half year.

The usual complimentary votes were passed to the Chairman and Directors and the officers; the one to the latter affording Mr. Anderson an opportunity of suggesting that their salaries should also receive consideration, seeing that the Company was making progress.

The proceedings then terminated.

CROYDON COMMERCIAL GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Wednesday, at the Offices, Katharine Street, Croydon—Mr. CHARLES NEWTON in the chair.

The SECRETARY (Mr. W. J. Russell) read the notice convening the meeting; and it was agreed to take as read the Directors' report and the accounts, particulars from which were given last week (p. 355).

The CHAIRMAN, in moving the adoption of the report, said that he had first to refer to the loss since the last meeting of another member of the directorate—Mr. H. J. Close—thus making the third successive half-yearly meeting that the Chairman had had the unfortunate duty of announcing the death of a Director. Mr. Close had been on the Board for upwards of 40 years; and during the whole of that time, he had been a most efficient Director—especially as a member of the Finance Committee. As to the business of the Company during the half year, it had been of the usual satisfactory character. Owing to the large growth of the ordinary business, and the extraordinary severity of the weather at the end of the past year, there had been a considerable increase in the quantity of gas sold over the corresponding period of 1889; amounting to nearly 18 million cubic feet, which was equal to 9 per cent. The result had been that, instead of having a loss of rental, consequent upon the less price charged to the consumers in the past half year compared with the second half of 1889, they had had a large gain. This was no doubt due not only to the large increase in the number of consumers, but also to the greatly extended use of cooking and heating stoves, and other appliances. They found that the increase which had taken place during the past half year had been continued during the present; and, therefore they had every reason to look forward to the current six months' working being also successful. Increased prices, amounting to a considerable sum, had also been obtained for residuals. With these increases, they had realized a far larger amount than was required for the payment of the dividends; and the balance would be added to the unappropriated profits. The number of stoves sold and let on hire during the half year was 480; and the increase was still going on in the same proportion. The plan that the Company tentatively adopted some time ago, of supplying small houses with gas, and charging the tenants by prepayment meters, and also a small sum for the hire of the fittings, had been very successful. During the severe weather they had a large number of applications; but they were unable to comply with them. There was no doubt that, in the course of a few years, they would have to look forward to this class of consumers; and this would mean that an increasing supply of gas would have to be maintained. They had now in use in Croydon 37 gas-engines; but there might be more of which the Directors had no knowledge. As the advantages of gas engines and stoves became more apparent, and their use extended, they would tend to make the stability of the concern all the more certain. Having stated that, according to the reports of the Corporation Gas Examiner, the Company had supplied gas of a higher illuminating power than was necessary by the Act of Parliament, he said that the net revenue was something like £2000 more than was required for the dividend; and, as he had already stated, they had wisely decided to add this to the unappropriated balance, which, with anything they might be able to add in the current half year, would enable them to meet the advance they would have to pay for coal, and also perhaps the expenditure they would incur in improving the plant to meet the demands of their customers. If they could do this without increasing the price of gas, he was sure it would be satisfactory both to the shareholders and the consumers. With reference to the accounts (making comparisons with the corresponding half of 1889), the gas-rental had increased, notwithstanding the reduction in price, by £1712. The increase in the rental for meters, stoves, and fittings amounted to £122. In consequence, he supposed, of the severity of the weather, and partly to the high price charged, there had been an enormous advance in the receipts for coke, amounting to £2200. An additional £66 had been received for breeze, and £462 for tar. Sulphate of ammonia, however, had realized a little less. With regard to expenditure, they had used an extra 1774 tons of coal to make the additional 16¼ million feet of gas; and they had expended £1732 more under this head. Wages had cost a further £291; and the repairs of works, £280. There was a small increase in salaries of £75, and on mains of £283. The unaccounted-for gas on the whole of the past year was between 3 and 4 per cent. This was very satisfactory; seeing that with most gas companies it averaged about 5 per cent. They had spent £186 more in the repair of meters and stoves; while under management, they had saved £200—due to

the fewer number of Directors than in 1889. The balance on revenue account was £1585 more than in 1889. With regard to capital, he believed they had not raised any for the past eight years; while the consumption of gas had increased something like 5 or 6 per cent., or about 12 millions, a year since then. Seeing how enormously the rental had increased in proportion to the capital, they could not expect this to go on much longer, because they had nearly come to the end of their tether as regards the capability of their manufacturing plant. The Directors were proposing to enlarge during the present season one of the gasholders, and replace one of the 45,000 cubic feet station meters with a 100,000 feet one. In different parts of the district larger mains would also have to be laid; and the outlay for these different extensions would have to come from capital, if not out of revenue. But from whichever source it was taken, they would have to issue some new shares in the course of the half year, but not more than was absolutely necessary.

Mr. W. HYSLOP seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. BENWELL, dividends were declared for the past half year at the rate of 14 per cent. per annum on the capital of £51,600, and of 11 per cent. on the capital of £137,500, less income-tax.

The retiring Director (Mr. W. Hyslop) was then re-elected; and Mr. T. Rigby, who had been appointed by the Directors to fill the interim vacancy on the Board caused by the death of Mr. Close, offered himself as a candidate for the position, and was unanimously elected. The retiring Auditor (Mr. A. Twentyman) was also re-appointed.

A vote of thanks having been passed to the Chairman and Directors, a similar compliment was paid to the officers; the Engineer (Mr. J. W. Helps) suitably acknowledging it on their behalf.

The proceedings then terminated.

PROVINCIAL GAS AND WATER COMPANIES.

The following paragraphs contain some particulars as to the working of the various Gas and Water Companies referred to during the periods mentioned.

Gas Companies.

The Directors of the Blyth and Cowpen Gas Company are able to record in their annual report a continued increase in the consumption of gas; amounting in the past year to 2,602,700 cubic feet, which is equivalent to 15¾ per cent. The amount standing to the credit of the profit and loss account is £1785, from which a dividend is recommended at the rate of 5 per cent.; making with the interim dividend, 7 per cent. for the year. This is 1 per cent. less than was paid for the previous year; but had it not been for the increased cost of coal and labour, the Directors would have been enabled to propose a larger dividend.

In accordance with the Act obtained by the Canterbury Gas and Water Company last session, there will in future only be one annual general meeting, which for this year was held last Friday. In the report submitted to the shareholders, the Directors, referring to the new Act, stated that power was given to remove the gas manufacturing plant to a new site near the London, Chatham, and Dover Railway, upon land which had been bought for the purpose; and this subject would have due consideration, when they were of opinion that the time for such an extension of the plant had arrived. In accordance with the undertaking given to the Parliamentary Committee, the works for the extension and improvement of the water supply, it was mentioned, had been commenced, and new and additional engines, pumps, and machinery were being erected at the pumping-station. When these were completed, the extra distributing plant would be proceeded with. The Directors regretted that the necessity should have arisen for a small increase in the price of gas; but the serious rise in the price of coals left them no alternative. The amount at the credit of the dividend account was £3738; and the Board recommended that a uniform dividend at the rate of 4 per cent. for the half year be declared on the gas and water capitals, and paid free from income-tax, making with the interim dividend of 4 per cent. paid in August last, 8 per cent. for the year. The report was adopted.

The report presented at the recent annual meeting of the Colchester Gas Company showed that there was a balance of profit amounting to £2008, from which a dividend at the rate of 10 per cent., free of income-tax, on the original shares and of 7 per cent. on the new series was declared.

Addressing the shareholders at the half-yearly meeting of the Derby Gas Company last Wednesday, the Chairman (Mr. G. Gascoyne, J.P.) stated that the gross receipts for the whole of the past year were £61,097, and the expenditure £45,818. The interest and dividends amounted to £8677; and the net profit on the year to £15,279. The reserve fund stood at £17,906; and in another month, it would be reduced to £14,950. The amount of gas sold was 394 million cubic feet, which was an increase of 22½ millions, and had added to the revenue £2575, which was very encouraging seeing that in 1887 only 355 million cubic feet was made; and in 1886 only 349 millions. Although in the report they saw £6083 extra had been charged for coal, which certainly seemed very heavy, yet this sum had provided them with all the coal required for producing the additional gas consumed. He might say at once that the position of the Company was such that the deficit of £3228 on the amount required for dividend could at any moment be extinguished by the mere reimposition of the 1d. per 1000 cubic feet remitted last year, if so desired; but they had decided to draw on the reserve fund for the amount. The report was adopted, and dividends at the rate of 10 and 7 per cent. were declared.

The accounts of the Douglas (Isle of Man) Gas Company for the half year ending Dec. 31 last show that the net profits were £3357—an improvement compared with the corresponding period of 1889. The increase of the business of the Company was such as almost to counterbalance the extra cost of coal. This was considered a very satisfactory position at the meeting of shareholders yesterday week; and they passed a resolution declaring a dividend of 35s. per share.

The report presented by the Directors of the Eastbourne Gas Company, at the meeting of the shareholders on Monday last week, stated that the profit for the past half year was £6664, which added to £5294 (the balance brought forward after making sundry adjustments and payment of the dividend in August last), gave a total sum of £11,958 available for dividend. The Directors recommended that dividends for the half year be declared at the rate of 13 per cent. per annum upon the £20,000 original capital, and also upon £12,490 (the amount raised on the "C" shares), and at the rate of 10 per cent. per annum on the £55,000 paid-up capital raised on the "B" shares, which would absorb the sum of £4740, and leave a balance of £7218 to be carried forward to the next account. In moving the adoption of the report, the Chairman (Dr. G. A. Jeffery) stated that the receipts for gas had been £16,494, as against £14,973 in the previous six months, which was a gain of £1521; but the expenditure had risen from £8170 to £9828—an increase of £1658. Towards this result coal was responsible for £1821; but residuals had brought them in £163 more—leaving the net extra cost of coal £858. The motion having been seconded, Mr. Fox-Watkins said he found from the accounts that in June, 1889, they had no arrears. In December of the same year, however, they had arrears amounting to £4145. In June, 1890, the arrears were reduced, according to the official statement, to £2053; and then in December, they had only arrears amounting to £733. He wished to know if these figures really represented the amount of arrears now due. The Secretary (Mr. J. H. C. Coles) replied that the figures were correct; and Mr. Worley, the Auditor, corroborated his statement. The report was adopted.

The annual meeting of the Eckington and Mosbrough Gas Company, Limited, was held on Wednesday last. Mr. F. Barber, who presided, read the Directors' report, which recommended (after providing for bad and doubtful debts), a dividend of 8 per cent. on the original shares, free of income-tax, and 7 per cent. on the additional shares, less income-tax. He stated that the works had been maintained in a thoroughly efficient state out of revenue; and the balance, after paying the dividends, would be £629. The report was adopted. Owing to the storeage accommodation for gas being inadequate to meet the increasing demand, it was subsequently decided to issue new shares of £5 each, to the amount of £2000, for the purpose of erecting a new holder.

At the half-yearly general meeting of the Hastings and St. Leonards Gas Company to be held next Thursday, the Directors will report that the business continues satisfactory. There was an increase to the extent of 7½ per cent. in the quantity of gas made in the past half year, as compared with the six months ending Dec. 31, 1889. It is scarcely necessary to say that the advanced price of coal and other materials has considerably affected the cost of manufacture; but it is gratifying to learn that this has, to a large extent, been met by the increased value of coke and other residuals. The works for the manufacture of sulphate of ammonia have been completed, and are now in operation. Some additional purifiers, in place of those erected in 1865, have been provided. In consequence of the increasing business of the Company, it has become necessary to call up additional capital. The accounts accompanying the report show a profit balance of £9377, which, with the balance brought forward, makes the sum of £30,233 to be dealt with by the shareholders; and it is proposed to pay a dividend at the rate of 12 per cent. per annum on the £25 shares, and one at the rate of 9 per cent. per annum on the £20 shares, and to carry forward the balance to the next account. The quantity of coal carbonized in the works (which are under the management of Mr. C. E. Botley, Assoc. M. Inst. C.E.) was 15,318 tons; the gas production being about 157½ million cubic feet. The residuals produced were: Coke, 9413 tons; breeze, 839 tons; tar, 148,368 gallons; ammoniacal liquor, 304,031 gallons.

The annual general meeting of the Longwood Gas Company was held last Tuesday. The Chairman (Mr. E. Armitage, J.P.), in moving the adoption of the report and accounts for the past year, dealt in detail with the various items of income and expenditure, and showed that notwithstanding a loss of upwards of £500, due to the advanced price of coal alone, the increased efficiency of the new retort-house and the economy exercised in the management of the works (which are under the supervision of Mr. Neill Meiklejohn) had enabled them not only to declare their usual dividend of 7½ per cent. per annum, but also to increase the balance to the credit of the profit and loss account by upwards of £200 more than they carried forward in the previous year. The Vice-Chairman (Mr. R. Thornton), in seconding the motion, referred to the very rapid growth of the Company, and, comparing the balance-sheet with the year 1878, showed that the amount of coal carbonized, the quantity of gas made and sold, the number of consumers—in fact, the whole of the manufacturing and distributing work of the Company, had increased to the extent of 270 per cent. while the capital had only grown at the rate of 12½ per cent. This, he thought, was a sufficient answer to any suggestion that the capital was being unduly expended; for whereas in 1878 they could make only about 200,000 cubic feet of gas per day, they had now almost entirely new works, occupying no more space, built on the same site, yet so much more efficient and so well arranged, that they were better able to deal with the manufacture and purification of about a million cubic feet per day than twelve years ago they could deal with one-fifth of this amount. The motion was carried unanimously. The retiring Directors and Auditors were re-elected.

The half-yearly meeting of the Pontefract Gas Company was held yesterday week. From the remarks made by the Chairman (Mr. Tew), it appeared that the total expenditure during the past half year amounted to £1966 and the receipts to £2887. The present price of gas was 3s. per 1000 cubic feet; and a further reduction was contemplated. Before next autumn two new beds of retorts would have to be erected, and larger mains laid to meet the constantly increasing demands of the Company's customers. The report was adopted; and maximum dividends of 10 per cent. on the original shares and 7 per cent. on the new ordinary shares (70 per cent. paid) were declared.

The half-yearly meeting of the Reading Gas Company was held last Tuesday—Mr. J. Okey Taylor presiding. The report of the Directors which was presented on the occasion opened with the recommendation that full dividends should be paid on all the stocks and shares of the Company. The plan of letting out on hire cooking and other stoves was referred to approvingly, as tending to increase the consumption of gas; and a growing income from this source is anticipated. The Directors again bore testimony to the excellent manner in which the works had been conducted by their Engineer (Mr. Edward Baker,

M. Inst. C.E.), and alluded especially to the efforts made by him and his staff to deal with the difficulties experienced in the past exceptionally severe weather. Regretful reference was made to the death of the Secretary (Mr. R. Bradley), whose long and faithful services to the Company from its commencement were recognized. It was announced that Mr. A. H. Cane had been appointed in his place. The accounts accompanying the report showed that the receipts in the half year were £26,450; and the expenses, £21,413—leaving a balance of £5037. From the statements relating to the manufacturing operations, we find that 12,616 tons of coal were carbonized, which produced 12,616 chaldrons of coke, 125,185 gallons of tar, and ammoniacal liquor sufficient to make 108½ tons of sulphate. About 128 million cubic feet of gas were sold to private consumers.

The accounts laid before the shareholders of the Redhill Gas Company at the recent annual meeting, showed a balance on the past year's working of £4107, out of which the Directors recommended a dividend of 9½ per cent., less income-tax. The Directors' report mentioned that a Company had been registered for the purpose of supplying gas to Godstone and Bletchingley, which were within the limits of their own Act, and they were applying to the Board of Trade for a Provisional Order. The Directors expressed their intention of watching the proceedings so as to protect the interests of the shareholders. The Chairman (Mr. J. Lees, J.P.), in moving the adoption of the report, referred to the labour troubles and the difficulty some gas companies had had in keeping up a supply of gas, owing to shortness of coal. The Company had fortunately not experienced any of these inconveniences; and he thought the steps the Directors deemed it necessary to take, at an increased cost, had been justified by the result. A pleasing test of their attention to economy was that the leakage had been reduced, which spoke well for the ability of their Manager and Secretary (Mr. C. Read). The coal consumed was 380 tons more than that used in the previous year; but the cost was £1112 more—19s. 4d., against 16s. 3d. per ton. As connected with, and seriously affecting the price of their raw material, he alluded at some length to the dues, for the abolition of which, he said, a "howl" went forth not long ago. But what was the result? In 1887 the price was 15s. 5d. per ton; in 1888, 15s. 11d.; and in 1889 (after the abolition), 21s. 8d. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend of 9½ per cent. This was agreed to. The remaining business consisted of the re-election of the retiring Directors and Auditor, and the passing of a complimentary vote to the Board.

The annual report of the Southbank and Normanby Gaslight Company, which was submitted at the meeting of shareholders last Wednesday, showed that the receipts on revenue account for the year amounted to £6477, which, together with a balance of £134 from last year, made a total of £6612. The expenditure came to £3634; thus leaving a balance of £2978. An interim dividend of 4 per cent. was paid in August last; and a further dividend of 5 per cent. was declared—making a total of 9 per cent.

At the annual general meeting of the shareholders of the South Shields Gas Company last Friday, the report presented by the Directors stated that the total receipts last year were £56,525, while the total expenditure was £41,721; leaving a balance of £14,804 to meet interest and dividend. There was a gross increase in the sale of gas over 1889 of 41,124,096 cubic feet; having a money value of £5016 5s. 7d., or 12 per cent. There was also a net increase of £4408 2s. 6d., or 46·88 per cent., in the sale of residuals. This good result was, however, more than counterbalanced by the increased cost of coals and labour; the former being £5118 2s. 1d., or 40½ per cent., and the latter £3992 10s. 9d., or 30½ per cent. in excess of the year 1889. The Directors expressed regret that the balance available for dividend was only sufficient to pay 4½ per cent. for the half year, which, with the interim dividend of 4 per cent., paid in September, would make 8½ per cent. for the year. In consequence of the reduction in the profits for the first six months of the year, due to the increased cost of coals and labour, the Directors were reluctantly compelled to give notice of an advance of 3d. per 1000 cubic feet in the price of gas, from Jan. 1. This would reduce the dividend by ¾ per cent., or from 10 to 9¼ per cent., for the current year. The Directors trusted that the increasing sale of gas, together with the advance in the price, would, during the current year, enable the Company to pay the statutory dividend of 9¼ per cent., and leave a surplus to carry to the reserve fund, which they were desirous of reinstating, as considerable extensions were necessary to meet the growing requirements of the Company. The adoption of the report was moved by Dr. R. Wallis, J.P., Chairman of the Company, and the motion was carried; and the dividends recommended were declared.

At the thirtieth ordinary general meeting of the Uxbridge and Hillingdon Gas Company, held on the 17th ult., under the presidency of Mr. W. Fassnidge, the Directors reported that the profit realized on the working in the past year amounted to £2819, which, added to the surplus profits of former years, gave a sum of £3063 available for dividends. These paid in full, less income-tax, would absorb £2597; leaving a balance of £466. Of this amount the Directors proposed to add £208 to the reserve fund, and carry forward £227. The report referred to the severe loss sustained by the Board by the death of one of their oldest and most valued members—Mr. Alfred Penny, M. Inst. C.E.—who served as a Director for 32 years. The Chairman, in moving the adoption of the report stated that, as compared with the preceding twelve months, there was an increase of £121 in the receipts last year; and that the quantity of gas sold and brought into charge was 38,575,100 cubic feet, against 32,434,200 cubic feet in 1889. This additional consumption took place principally in the Christmas quarter. On the expenditure side of the account, notwithstanding the increased cost of coals and the rise in wages, the gross outlay had been carefully kept down; the result being that a sufficient profit had been realized to pay the statutory dividends. This very satisfactory result was largely due to careful management and skilful working; all the buildings, machinery, and plant being in first-rate condition. The Directors were able to propose the full dividends, and carry forward a balance of £227—a result which they regarded as highly gratifying. The price of gas had been reduced 3d. per 1000 cubic feet to all consumers who were paying more than 4s. per 1000 feet as from March, 1889. With reference to the public lighting, at which some dissatisfaction had been expressed by the inhabitants of Uxbridge, he mentioned that the Directors had approached the Local Board on the matter, offering, if they would increase the quantity of gas consumed to 5 cubic feet per lamp per hour, to reduce the price to 3s. 6d. per 1000 cubic feet; and an alternate proposition was submitted that they would lower it to 3s. 9d. if the Board would agree to burn 4 cubic feet per hour. The Board, however, refused to entertain either of the proposals. The fact was that during the past three years, although more lamps had been put up, less gas was used; the actual figures being 9221 cubic feet per lamp in 1888, 8878 cubic feet in 1889, and 7635 cubic feet in 1890. There were regulator burners which would not pass more than 3, and possibly not even 2½ cubic feet per hour. He knew of no place where so little gas was used per lamp for the public lighting. He concluded by referring to the great loss the Company had sustained by the death of Mr. Alfred Penny, to whose abilities as a gas engineer and administrator he paid a high tribute. Mr. Rayner seconded the motion. Mr. Russell criticized the management of the Company, and asked if the Engineer and Manager (Mr. S. Penny, Assoc. M. Inst. C.E.) had to give the whole of his time to his duties. The Chairman said Mr. Penny had to devote all the time that was necessary to the efficient conduct of the works; but, with the Directors' permission, he could go elsewhere. Mr. Russell thought the salary paid to the Engineer was very good, considering this privilege. The Chairman admitted that it was; but then it must, he said, be borne in mind that they had a very efficient officer, by whom the works were ably managed. The Company's district was a rambling one, stretching out on different sides; and it needed a great deal of supervision in order to keep down expenses. These were kept down by their Engineer, who he believed was doing his best for the Company. However, the remarks made on this subject should have the attention of the Board. Mr. Atkins asked if the reserve fund was invested. The Chairman replied that it was used as capital to carry on the business. Mr. Atkins said he thought the fund should be invested, as was done at Slough. The motion was put and carried unanimously. The Chairman said it might, perhaps, be interesting to the shareholders to be informed that the Company had not suffered from any labour trouble, or from stokers' strikes. Their men had been perfectly loyal, and had strictly resisted the blandishments of the agitators, and refused to join the Union; thus showing their wisdom in this respect. They had not a Union man on their premises. The retiring Directors and Auditor having been re-elected, a resolution was passed authorizing the Directors to raise a further sum to the extent of £2500 on mortgage debentures, for the purposes of the Company. Votes of thanks were then accorded to the Chairman and Directors, Secretaries (Messrs. W. and W. M. Gardiner), and Engineer, for their services on behalf of the undertaking; and these were suitably acknowledged.

Yesterday week, the half-yearly meeting of the Wakefield Gas Company was held. In the course of the Chairman's (Mr. W. Statter's) observations, in moving the adoption of the report, he said the Directors were very glad to be able to put before the shareholders what they considered a very satisfactory report; for, notwithstanding the increase in the prices of coal and labour, they were able to recommend the usual dividend. The quantity of gas made during the past year was 228 million cubic feet, which was an increase of 6 per cent. on the year. Since 1877 the consumption of gas had more than doubled. The leakage for the past half year was 12½ per cent.; but it was accounted for by nine of the mains having been broken during the recent severe weather. The consumption of gas in the winter had been on an average about a million cubic feet per day. He intimated that the Directors intended to make preparations for a further increase in their manufacturing plant; and that they had received £840 more last half year for residuals than in the corresponding period of 1889. Mr. G. Haigh seconded the motion, and it was carried. A resolution was passed to the effect that the usual dividends at the rate of 11½, 9, and 8½ per cent. on the various classes of shares should be paid, clear of income-tax, leaving £623 to be carried to the next accounts. Mr. Parker, who has for the past fourteen years acted as Chief Clerk, was then unanimously elected Secretary, at a salary of £200 a year.

The half-yearly meeting of the Wolverhampton Gas Company was held last Tuesday. The report for the past six months showed that the profit on the working had been £7254, and that the Directors recommended the payment of dividends equal to 10 per cent. per annum on the ordinary shares, and 6 per cent. on the preference stock. The Chairman (Mr. J. Underhill), in moving the adoption of the report, referred to the higher price which had now to be paid for coal, and said that the charge for gas had consequently been advanced 2d. per 1000 cubic feet. So far as he could judge, they would not require to make any alteration in the price this half year. The Directors proposed to increase their outlay a little by the provision of more retorts. In consequence of the action of the Corporation in regard to the electric light, this extension had been deferred; but now, believing that electricity would not take away many of their customers, they were resolved to go on with it. Mr. Owen seconded the motion, which was adopted. Votes of thanks were passed to the Directors and officials; Mr. J. Annan responding on behalf of the latter.

Water Companies.

The half-yearly meeting of the East Worcestershire Water Company was held last Thursday. The report presented by the Directors showed a balance to the credit of the revenue account of £520, which, added to the amount brought forward from the previous accounts (£660), made a disposable balance of £1180, which it was proposed to carry forward. The Chairman (Mr. C. P. Noel), in proposing the adoption of the report and balance-sheet, said it was evident the Company was progressing favourably. The water-rentals had increased steadily and satisfactorily. In 1886 the sum received was £1313; in 1887, £1480; in 1888, £1686; in 1889, £1954; and in 1890, £2259. The report was adopted.

The annual meeting of the Newcastle and Gateshead Water Company was held last Tuesday. The Chairman (Colonel Potter), in submitting for adoption the Directors' report—some particulars from which were given last week—said that the revenue had increased during the year by the sum of £6260. This was not, however, the largest increase in one year they had had; for, ten years ago, it was

£6638. But there was this difference between the years 1880 and 1890—that, previous to 1880, they had had some very bad seasons. They had had during the present winter a very severe frost, which took a considerable quantity of water from the reservoirs. The normal consumption of water for domestic purposes was about 7,500,000 gallons per day; and during the frost they were distributing double that quantity on account of the waste by people allowing the water to run to prevent the pipes freezing. The report was adopted, and the dividends recommended were declared. A special meeting was then held, at which the Directors were empowered to raise £200,000, out of the capital authorized by the Company's Act of 1889, by the creation and issue of £200,000 of 5 per cent. preference stock. In the course of his remarks, the Chairman mentioned that the capital account had been overdrawn to the extent of £47,415.

At the half-yearly meeting of the South Staffordshire Water Company, held in Birmingham last Thursday, Mr. Frank James, who presided, referred to the satisfactory nature of the accounts, an epitome of which was given in the JOURNAL a fortnight ago. He said the number of houses now supplied by the Company was 72,278; and the amount received for water-rents was more than that of the previous half year. They had a profit of £16,721 to deal with; and they proposed to put £2000 to the renewal fund, and pay a dividend of 5½ per cent. The past six months had been a very hard time for water companies; the great drought of the summer making the annual rainfall 10 inches less than the average of 28 inches. Then the intense frost of the winter was even worse than the drought of the summer, owing to the great waste of water. Fresh supplies had been tapped at Bradley and Dudley; and the Company were forced to make this addition because everything tended to show that the coming summer would be even drier than the last. The storeage capacity of the works was 171 million gallons. In case it might be necessary to increase the capital of the Company, the Directors intended to call up £68,000—£48,000 from the proprietors and £20,000 on debentures. The report was adopted.

The half-yearly general meeting of the West Surrey Water Company was held at the offices, No. 38, Parliament Street, S.W., last Tuesday—Mr. A. Telford Simpson, C.E., in the chair. The Directors reported that the income for the six months ending Dec. 31 last, after making provision for empty houses, irrecoverable rates, &c., amounted to £2491, and the expenditure to £1017. Comparing the accounts with the corresponding half of 1889, the income exhibited an increase of £121, and the expenditure a rise of £28. There were 1851 yards of cast-iron pipes laid for the extension of service-mains; and 79 new supplies were connected, representing a future rental of £214 per annum. The Engineer and Manager (Mr. John K. Hill) reported at the close of the year that the whole of the Company's engines, boilers, buildings, filter-beds, reservoir, mains, and works were in good order. The balance brought from the previous half year, less the dividends paid in August last, was £192, which, added to £1474, the credit balance on the half-year's working, made £1666. After deducting from this the interest on the loans and debenture stock (£251 7s. 6d.), there was a balance of about £1414, which the Directors recommended should be applied to the payment of dividends upon the preference shares, amounting to £536 10s., and to the payment of a dividend at the rate of 3½ per cent. per annum upon the ordinary shares, amounting to £603 8s.; leaving a balance of about £274 to be carried forward. The Secretary (Mr. H. G. Thompson, Assoc. M. Inst. C.E.) having read the notice convening the meeting, the Chairman moved the adoption of the report; and this was agreed to. The dividends recommended therein were declared; and the proceedings closed with the usual vote of thanks to the Directors and officers.

The ordinary general meeting of the Woking Water and Gas Company was held last Tuesday at Winchester House, Old Broad Street. The Directors reported that the total expenditure to date on capital account was £65,828. The revenue for the year amounted to £3953; and the expenses on revenue account, including depreciation and law charges, to £1580. The balance carried to profit and loss account was £2373; and the amount available for dividend was £1157, out of which the Directors recommended the payment of a dividend at the rate of 3½ per cent. per annum for the past half year. The Directors also mentioned with regret that during the year Mr. T. H. Hovenden resigned his seat at the Board, in consequence of ill-health, and they had elected Mr. J. Baker, a Director of the Portsmouth Water-Works Company, to fill the vacancy. The Chairman (Lieut.-Col. E. Galt), in moving the adoption of the report and accounts, said that in the opinion of the Board, the position of the Company was very satisfactory, because there had been a gradual increase of revenue during the whole of the time it had been established. He was glad to say that they continued to receive many applications for water from large consumers; and that the new works were progressing with great regularity. Last year they were called upon to carry their mains to the "New Wimbledon"—Bisley Common. This their Engineers (Messrs. J. Quick and Son) did in a very satisfactory manner; and when the Rifle Association were there during the year the supply of water was very plentiful. With regard to the new wells which the Engineers had been sinking at West Horsley and the adits they had been piercing, they reported that a number of fissures had been tapped, and water flowed very freely. Speaking of the Surrey and Hants District Water Act which the Company had purchased, the Directors felt that they were compelled to do this to prevent competition on what he might call the frontiers of their own district; and although they paid upwards of £4000 for it, they believed it would in the end be a great protection to the Company. Mr. C. Horsley, J.P., seconded the motion. In the course of the discussion which ensued, Mr. Stedman protested against Mr. Baker being appointed a Director; and he maintained that a man who resided in the locality where the Company carried on their operations should have been elected. Mr. Wermig strongly supported this protest; and described the Surrey and Hants Water Act which the Board had purchased as a "white elephant." He also asked whether it was a fact that another Company had bought the right to light the district with gas. If so, he submitted that the Directors had not kept good faith with the shareholders in not giving them an opportunity of saying whether or not they would part with that right. The Chairman said, in reply, that Mr. Baker was fully qualified to be a Director. It was all very well for gentlemen residing at Woking to acquire a few shares, and then come and demand the election of a local Director; but he must remind them that when the Company was first started, they did not come forward with their advice and money, but it was left to the Board and their friends to find the money with which to construct the works. Mr. R. Hesketh Jones, J.P., replied to the question regarding the gas supply. He said that the Board had considered the question of supplying gas in the Woking district; and they had arranged with a firm of gas engineers to obtain a Provisional Order empowering the latter to supply a certain district within the Company's area. If the Company had erected gas-works on the site they first of all took over from the original concessionaire, it would have been necessary to have laid a large gas-main of an unproductive character, which would have been a loss to the Company. Therefore it was better that a subsidiary company, as it were, should be formed to carry on the manufacture of gas. They would receive from the new Company £500—£250 in cash and £250 in shares. They had not, he added, conceded the whole of their gas powers. The motion was then carried; and the dividend recommended was declared. On the proposal that Mr. Edwin G. Fox should be re-appointed a Director, a counter-motion was made, that Mr. Stedman be elected in his place; but this was defeated.

The Water Supply of Copenhagen.—*Industries* says the important extension of the Copenhagen Water-Works now going on comprises more efficient arrangements for obtaining water, and will give additional pumping installations to the town. The supply of water from the Söndersö Lake will be increased to 130,000 barrels per diem by means of new borings. Several of the old bore-holes have collapsed through the destruction of the iron pipes from rust and wear and tear, so that the daily supply of water has been reduced to some 40,000 barrels. The new borings comprise eight holes, made to 6-inch wrought-iron pipes, in which 4-inch cast-iron pipes are inserted. This arrangement, which has been made with a view to durability, will probably yield a great additional amount of water at a moderate outlay, and will allow of further extensions. If these should be much increased, it will, however, be necessary to enlarge the pumping-station at Söndersö, and to raise the capacity of the pipes from that place to the town.

The Quality of the Chester Water Supply.—Reference has been already made in the JOURNAL to the strictures of the Bishop of Chester on the quality of the water supplied to that city. The recent annual meeting of the Church of England Temperance Society afforded him another opportunity of attacking the Water Company. The Duke of Westminster presided on the occasion; and the Bishop, in congratulating his Grace on the privilege he enjoys of possessing his own water supply, expressed the hope that the day was not far distant when the citizens of Chester would have for their use water that was absolutely above suspicion. If people were going to part with the old beverages, he advised them to be certain that they had thoroughly sound ones left behind. This, he said, was a subject to which he had felt it his duty to allude more than once before; and he intended to go on alluding to it until the thing was done. Boiled water might be all very well as a temporary expedient; but surely the enlightened citizens of Chester would not be content with a water which their best scientific advisers said they ought to boil before using. His Grace, in reply, heartily supported the Bishop in his remarks. Alluding to the Eaton supply, he said the water was originally obtained from a very much higher and purer source than that of the Company, and went through excellent filtering-beds; but the quality was not satisfactory even then, and the Eaton water now came from Wrexham. He only wished the city procured its supply from the same place, and not from the tainted sources of the Dee. He almost shuddered, on driving over the Dee Bridge that very day, to see the high spring tide carrying the sewage a good distance above the intake of the Company. It was impossible to suppose that people could all boil their drinking water. He hoped the Bishop would continue the fight—in which he (his Grace) would be very glad to support him—for a purer water supply. It is stated that copies of the foregoing remarks have been forwarded to the Local Government Board, with the view of obtaining their intervention in this matter, on behalf of the citizens.

The Sale of Gas Coke at Rotherham.—An article appeared a few days ago in a Sheffield contemporary in which it was intimated that some difficulty is now being experienced at the Rotherham Corporation Gas-Works with regard to the storeage of coke. Referring to the agitation last year on the question of the sale of coke at the works, it is stated that some of the customers, who had previously purchased large quantities, declined to buy, and obtained their supplies elsewhere. The Corporation had taken every advantage of the heavy demand in the market for coke, and had run up their prices to a high level. But the unwisdom of the policy which has been pursued is now manifesting itself in a marked degree at the works. Large quantities of coke have been stocked at a cost varying from 9d. to 1s. per ton, which, apart from the waste, will tend to considerably diminish the profit which might have accrued. The present prices for gas coke at the works are: Large coke for manufacturing purposes, 13s. 4d. per ton; house coke (crushed), 14s. 10d.; smiths' coke No. 1, 15s. 5d.; and blacksmiths coke, 14s. 2d. A few weeks ago the prices were: For crushed coke for household use at the works, 15s. 3d. per ton; with monthly credit, 15s. 8d. and delivered to consumers' premises, 16s. 7d. to 17s. 11d. The room for storeage is now asserted to be entirely taken up; and the serious question has arisen what is to be done with the coke. One enterprising merchant has offered to solve the problem for the Corporation by undertaking to clear the immense stock at 8s. per ton; but the terms have not been accepted. Meanwhile local firms are being visited by travellers tempting them to purchase coke at prices much below the "market value" put upon the coke at the gas-works by the Corporation. Barnsley coke, which is 10s. per ton, and Clay Cross coke, which is 8s. per ton at the gas-works, is being offered for delivery at Masbro' Station at 12s. per ton; and much lower prices than these are stated to have been quoted to local manufacturers, with the advantage of 21 cwt. instead, as at the Rotherham works, of 20 cwt. to the ton. The difficulty at the gas-works as to storeage is believed to be a pressing one.

METROPOLIS WATER SUPPLY.

The London County Council and the Proposed Water Legislation.

In the JOURNAL last week we referred to the special report recently presented to the London County Council by the Parliamentary Committee on the subject of the Water Bills now before the House of Commons. These, it will be remembered, were originally six in number—viz., the London Water Commission Bill, the London Water Meter Bill, the Metropolis Water Supply Bill, the Metropolitan Water Companies' Charges Bill, the Croydon Water Bill, and the Southwark and Vauxhall Water Bill; but they have been reduced to five by the withdrawal of the Meter Bill. The Private Bills contained in the above list having been generally reported upon and petitioned against by the Council, it remained to deal further with the Commission Bill and the Public Bills. The most important of the latter is the Metropolis Water Supply Bill, promoted by the Vestries; and its provisions, as well as those of the Bill of the Corporation, are fully discussed. We give below an abstract of the report; reproducing more fully the portions relating to these two measures.

The Committee commence by stating that among the issues raised by the London Water Commission Bill and the Metropolis Water Supply Bill, the one of primary importance as to the advisability of creating a new body—whether Trust or Commission—to whom the London water supply should be immediately entrusted. This question, they point out, involves a second and equally important one—viz., Should the London County Council be the body to deal with the water supply on behalf of the consumers? On the first point, the Committee unhesitatingly express an opinion in the negative; and the considerations which lead them to do so will, they think, support an affirmative answer on the second. They then proceed to explain their reasons for giving this answer. They state that the circumstances of London, as regards water supply, are the same as in most other large towns—the question differing only in magnitude, not in principle; and in nearly all the chief centres of population the water supply has been placed in the hands of the municipal authorities. They then proceed to show that the general principles of water supply are applicable to the Metropolis; and quote from the report of Sir W. Harcourt's Committee in 1880 the expression of opinion that the supply of water to the Metropolis should be placed under the control of some public body, and that in the absence of such body one should be created. The Committee think it can hardly be suggested that the Council is not such a municipal body as was there indicated. The Committee next discuss the chief objections that have been raised to the transfer of the water supply to the Council. First, it has been supposed by the advocates for creating a new body that the Council are already more overburdened with work than the municipal authorities in the large cities who now control their water supply, and that therefore they would be unable to find time to undertake this important matter. The Committee think this need not be feared. They acknowledge that the work of the Council during its first years has been necessarily heavy; but they say that "the experience gained, the organization and arrangements effected during this period, is simplifying, and may be expected to simplify, the work in the future. Larger delegation of powers to Committees, the diminution of the number of members serving on Committees, better distribution of work among Committees will tend to the relief of the Council, and render it not difficult to find an influential Committee which will devote constant attention to the management of this business." Secondly, the peculiarity arising from the relative positions of the Corporation of the City of London and the Council are considered. While recognizing the services rendered by the City in connection with the question of water supply, they are unable to draw any substantial distinction between its position in this respect and its position in regard to main drainage. If any difficulty arises, or is likely to arise, it will result from "relations already anomalous," and will not be remediable by the introduction of a new body and additional complications. Lastly, with regard to the special circumstances, of the towns and districts lying outside the area over which the Council exercise authority, but supplied by the Water Companies, the Committee have only to observe that every problem involved between London and the adjacent districts has already been solved in other places. They add, that this conclusion is strengthened by an examination of the special proposals for establishing a new authority contained in the two Bills under consideration.

The Committee then proceed to discuss in detail the Commission Bill of the London Corporation. After explaining the constitution of the body proposed to be created under it, with which our readers are by this time familiar, the Committee indicate some of the difficulties the Commission would probably encounter. They say that "having regard to the manner in which the various interests proposed to be represented would be balanced, even a preliminary agreement upon the general policy to be followed would be difficult of attainment. But even if this were overcome, and a majority of the Commission concurred in the presentation of a Bill to Parliament, it is scarcely possible that it could be based upon anything like unanimity of opinion. Opponents would have the views of a minority—perhaps a large minority—to support them; and the prospects of passing a Bill in the circumstances, opposed as it certainly would be by one or more interests affected, would be remote. However disadvantageous to London any such Bill might be considered, either by the County Council or by any large section of the inhabitants, they would probably be precluded from opposing it, as it would have been introduced into Parliament by a Commission on which the Council was represented. Should, however, these preliminary difficulties be overcome, something like the following results might not improbably be expected: The object in establishing the Commission is first to secure and second to manage the water supply of London and the outside districts. It would therefore be necessary to the continued existence of the Commission that it should accomplish the first of these objects. It can do this, subject to obtaining the necessary parliamentary powers, by (1) an alternative and independent supply; (2) acquiring the undertakings of the Companies by agreement, including a full settlement o all details, or settlement of terms for submission to arbitration; or (3) acquiring by arbitration on terms not accepted by the Companies. They must proceed either by contentious Bills in Parliament (which would, of course, be strenuously opposed by the Companies), or they must, if they adopt the second alternative, proceed by negotiation, which would in its essence also be contentious. In either case they would contend on most unequal terms. The Companies are united, experienced, deeply interested, well-informed, and wealthy. The Commission would be discordant, unorganized, ill-informed, and ill-equipped. It has no income, except a loan of £5000 from the Corporation, to meet its expenditure. The financial obligations resting upon the Commission are as follows: To provide and maintain a fit and convenient office for holding the meetings of 51 members and transacting business; to appoint and pay a Secretary and such officers and servants as may be required; to pay auditors of accounts, and the 49 nominated members; to disburse all necessary expenditure of the office; to make inquiry into the present and possible future sources of supply; and to promote a Bill or Bills in Parliament (if in opposition to the Water Companies, a most costly business). The Commission would have the strongest inducement, through lack of funds and the necessity of preserving its existence, to come to terms with the Companies; it could neither afford to remain inactive nor to risk defeat in a parliamentary contest with them. The appointment of such a Commission—unwieldly and incongruous in its composition and unfitted to enter into negotiation and contest with the united Companies—would, under the circumstances described, be virtually to place the interests of the people of London in the hands of the Water Companies. The Bill, by its vagueness, and by relegating difficult questions to the obscurity of the future, escapes objections which would otherwise have been obvious." The Committee come to the conclusion that the Water Trust proposed by the Corporation Bill must inevitably, when they get to work, find themselves involved in the difficulties, financial and administrative, which are more fully exposed in the scheme of the Metropolis Water Supply Bill (which they think will not, after adequate consideration, have the approval of the London Vestries), to which they next proceed to advert in the following terms:—

The Bill starts upon the assumption that the existing water undertakings must be immediately purchased on arbitration terms. We think most members of the Council would hesitate, without far fuller information than we as yet possess, to commit the ratepayers of London to buy these works at whatever figure an Arbitrator or Board of Arbitration may award, or to enter into an arbitration without Parliament having laid down any definite rules in relation to the terms and conditions affecting the purchase. There are *primâ facie* grounds for believing that the market value of the Companies' stocks, as expressed by recent Stock Exchange quotations, is unduly large, being influenced by other considerations than those of intrinsic value; that unduly high dividends have been maintained—money having been disbursed by way of dividends which ought to have been applied to expenditure on matters either neglected entirely or provided out of capital; that the works and plant are in some respects obsolete; that no adequate allowance has been made for depreciation; and, above all, that heavy expenditure (probably long unprofitable) in the establishment of a new or supplementary system of supply is desirable and perhaps imminent. The Council has already voted in favour of a resolution asking the Government to institute inquiries covering fresh sources of supply. If, as appears not improbable from the reports made by the officials of the Government and of the Council, it should prove that the present sources of supply are, or soon will be, inadequate, and that great expense will have to be incurred to procure fresh sources of supply, this fact will materially diminish the value of the property which the Municipality is to acquire under the arbitration. And yet, as this Bill stands, the Arbitrators, in the absence of definite instructions from Parliament on the subject, would probably have neither the power nor the disposition to take this fact into consideration. They would certainly not be obliged to do so; and the arbitration might thus saddle Londoners with the price of an undertaking one-half of which would be valueless to them. Should there be real ground for suspecting any of the above-mentioned contingencies to exist, it would seem most inexpedient that an outside body, without the experience of the Council and its predecessors—in fact, devoid of experience on the subject—should commit London to the result of such an arbitration.

One of the principal clauses of the Bill is so drafted as to place the proposed Trust under a statutory obligation "to carry into effect the purposes of the Act," not only by the acquisition of the Companies' undertakings, but also "by the enlargement and improvement of their water-works, the construction of new water-works, and the supply of water from new and independent sources." This would impose on the Trustees the "trust" not only of purchasing the whole of the existing works, but also of constructing new works and supplying water from new and independent sources—a policy to which it can scarcely be conceived that the inhabitants of London ought to stand committed. It is probably no exaggeration to affirm that whereas a totally new and satisfactory series of works might be provided at an estimated cost varying from £10,000,000 to £15,000,000, this extraordinary scheme might cost London, if carried out as proposed by the Bill, some indefinite sum approaching £50,000,000.

The arbitration provisions of this Bill seem to be open to grave objection. Clause 13 provides that the Arbitration Board shall consist of four members, to be appointed respectively by the Local Government Board, the Institute of Bankers, the Institution of Civil Engineers, and the Surveyors' Institution. It may obviously be predicted of such a Board, that the nominee of the bankers would support the interests of capital. The Surveyors' nominee would follow the practice (apart from any special provisions of the Bill) in awarding a high value on a compulsory sale, in which he would probably find support from the nominee of the Civil Engineers. Apart from such purely speculative suggestions as to the policy of these nominees, they are expressly made arbitrators, within the meaning of the Lands Clauses Acts; so that there is, as it were, a statutory direction not only to award the cost of the arbitration as against the purchasers (subject to some special powers not affecting the principle), but to make the additional allowance in respect of compulsory purchase which has

become habitual under the Land Clauses Acts. The Arbitration Board are required to have regard to the value of undertakings "prior to the introduction into Parliament of the Bill." This is probably intended to prevent the arbitrator from basing his award on any increase in the selling price of the stocks which may be brought about with a view to influence the award. But we think it is not unlikely to have another effect, which should be guarded against, and may bind the arbitrators to an award of not less than the "market value" of the stocks prior to the introduction of the Bill. It is obvious that if half of the suggestions above made in deterioration of the value of the water undertakings have any foundation in fact, they will become matters of public notoriety, either during the progress of the parliamentary proceedings, or after the passing of the Bill into an Act (if it should pass); and although the disclosure of any such facts might reduce the saleable value of the stocks to accord with the intrinsic value of the undertakings, it is probable that this result would be excluded from the consideration of the Board of Arbitration under the terms of section 14. We feel no doubt that the promoters and the Council would be in accord on the principle involved. It is true that the power possessed, or claimed to be possessed, by any Company to make up deficiencies in the dividends of previous years is stated to be abandoned; but whether any such power exists, and whether, but for this enactment, an arbitrator could properly take it into consideration, is very doubtful.

The financial scheme of the Bill is intricate, and, as we believe, unsatisfactory. The proposal involves the creation of consolidated water stock charged (under clause 21) upon the water revenue and the "local rates" of the Metropolitan water area. The expression, "the local rate," is stated to be defined in the third schedule to the Bill, from which it seems that in London it means—in the City, the consolidated sewers rate; in the other parishes and districts, the general rate; and in the Temple and other places mentioned in Schedule C of the Metropolis Management Act, the poor rate. It is uncertain whether any charge on any rates outside the London county boundary would be conferred by the Bill. We do not think that the Council or any other authority controlling public funds could assent to provisions under which a foreign body should have power to issue a mortgage security having any charge upon the rates under their control. This scheme is such as, even if it were allowed, would constitute an unsatisfactory security for the proposed stock. It will, indeed, be seen that the possibility of difficulty in obtaining contributions out of the local rates has not altogether escaped the promoters, as it is proposed by clause 21 to give the Water Trust power to appoint an officer to collect rates to pay their precepts. If we are right in believing this proposition to involve such inconvenience as to be probably inadmissible, it follows that the only security for the money proposed to be advanced will be the "water revenue." If this financial scheme be compared with the alternative of exchanging the water stocks for Metropolitan consolidated stock in proportion to their real value, the difference will be apparent. Financial authorities will estimate the relative value of the two securities; but probably the smallest difference which could be attributed to them would be some ¼ per cent. It would appear that, assuming a capital of £20,000,000, there might be a loss of £50,000 a year involved n the scheme now under consideration, and so in proportion to the sum required.

It occurs to us to summarize the main objections to this Bill as follows: (1) Multiplication and confusion of jurisdiction; (2) unsatisfactory and extravagant finance; (3) interfering with principles of rating, and delegation to another body of a power to mortgage the rates; (4) delegation to arbitrators of principles which should be determined by Parliament; (5) delegation to arbitrators of too wide and vague powers; (6) unsatisfactory character of the arbitration tribunal; (7) no direction to the arbitrators, except such as will enhance price; (8) the establishment of a new body to carry out this enormous transaction with the Water Companies; (9) enabling the vendors, with all their accumulated experience, knowledge, and official strength, to deal with purchasers entirely inexperienced and devoid of information or the sources of information essential to success.

It is at best doubtful whether the substitution for the Companies of any Commission foreign to the Council would not have other disadvantages. The Council, as representing the inhabitants and ratepayers, has many questions to consider and deal with. Among them are the efficiency of the works for existing and future requirements, the price charged, the method of supply, the interference with streets, and the destination of surplus profits arising from the water supply, all of which might involve as constant conflict between the Council and the Commission as between the Council and the Companies. The sole interest of a Commission, like that of the Companies, would be to show a margin of income over expenditure. Any such margin would probably be applicable in reduction of charges for water supplied. It is so expressly provided by the Metropolis Water Bill (subject to a provision as to the "equalization of water-rents, and all charges incidental thereto, throughout the Metropolitan water area"). In short the Commission would be representing the consumers of water throughout the whole area of supply, whose interests are by no means identical with those of the Metropolitan ratepayers, who might nevertheless be compelled to keep the Commission going by making up any deficiency in income. The Commission would not be the rating authority, and it would not be charged with sanitary duties or the supervision of public health; and it is conceivable that it might adopt, or seek to adopt, some system of charge or supply which would bring it into immediate conflict with the Council in its natural policy of securing for the poorer classes as large a supply of water with as little charge to them as practicable.

This leads us to the second main question above proposed—viz., Should the power of dealing with the London Water Supply be now entrusted to the Council? The Council has already taken two important steps in this matter. It is inquiring, under powers given by an Act of last year, into the question of fresh sources of supply; and it has petitioned the Government to institute an independent and authoritative inquiry on this all-important question.

The Committee then make some observations on the value of the existing works of the Water Companies; and state that every step taken in the investigation of the purchase question shows the necessity for caution in taking them over and in sealing the terms of transfer. The Conservators of the Thames and Lea having "sold" the water of these rivers to the Companies, and this water, moreover, being of an unsatisfactory character from a sanitary point of view, if the Council took up the business a demand for a new and purer supply would be sure eventually to arise, and they might be forced into a very large expenditure on a new scheme. The Committee consider that a fresh supply, amply sufficient for all the purposes of a community, could be introduced from an entirely independent source at a cost of about half the price demanded by the Companies for their works, and that the introduction of such a supply would be subject to the authority of Parliament. They say that "the more fully the agreements of 1880 are considered, the more improvident they appear; and care must be taken that, in any arbitration, these agreements should in no way be allowed to prejudice the question." Passing on to consider the provisions relating to the transfer to the Council of the powers sought by the Bill, the Committee object that the duties of the proposed Water Trust would be thrust upon them at a most inconvenient time—just after their re-constitution in 1891. The Council would doubtless have to acquire such part of the property of the Companies as is valuable and efficient; but the Committee say it must be on proper terms—not on such an arbitration as is provided for by the Bill. It must be a purchase founded on the real value of the property, and not on dividends, or on market value which depends largely on dividends. "If," say the Committee, "there is to be arbitration, any arbitrator assessing the price should be bound to consider, not the existing market value of the Companies' stock or dividends paid by them, but the actual intrinsic value at the present time to the inhabitants of London of the series of water-works which they are asked to purchase. It would seem not unfair that he should consider (and not exceed) the cost which a totally new and satisfactory source of supply might be expected to involve; and he should consider the value of potable water drawn from the existing sources under existing statutory and sanitary conditions, as compared with the value of water which might be obtained from purer and more abundant sources." The Committee have prepared a short Bill seeking powers for the Council to introduce into Parliament Bills dealing with the water question.

In conclusion, the Committee, as stated last week, recommended the Council to oppose both the Bills above discussed; and, in the event of their being referred, to intimate to the Select Committee that the Council would be prepared to take in hand the question of the water supply of London, subject to powers being conferred upon them to introduce Bills dealing with the matter, including the establishment of a new supply, and the improvement of the existing supplies, should further investigation prove such a course to be desirable. As already mentioned, the report came before the Council at a special meeting held on the 17th ult., when a resolution embodying its recommendation was passed.

The Local Authorities and the Water Question.

Last Friday, a Conference of members of Local Authorities, convened for the purpose of considering the Metropolis Water Supply Bill, took place in the County Council Hall, Spring Gardens, under the presidency of Sir Algernon Borthwick, M.P. There was a large attendance. The Chairman, in opening the proceedings, referred to the steps that had been taken since 1867 to bring about the transfer of the water supply of the Metropolis to one public authority. He said that Mr. (now Lord) Cross introduced a measure which for many reasons obtained celebrity; but it fell through, although Sir W. Harcourt's Committee reported unanimously and in the strongest terms to Parliament that the water interest should be vested in a central water authority, which should at once be instituted. Nothing, however, was done; and now the question was again forcing itself upon public attention. The Government had their hands full of other business; and unless the pressure of public opinion was brought strongly to bear upon them, they would probably not move in the matter. Four Bills had been introduced into Parliament dealing with the subject; and it was quite desirable that the question should be settled as soon as possible. Water was the first necessity of life; and yet they were told that London was for a short time within measurable distance of a water famine, especially in the East End. This occurred to some extent in 1887; and it might, of course, recur with any dry summer. It was obvious that the supply must be made more adequate to the needs of the Metropolis; and the best way to effect this improvement was to purchase the Water Companies' interests, and hand over the management to a central authority. Mr. H. Wilkins, Secretary to the Executive Committee of Vestries and District Boards, went through the clauses of the Bill *seriatim*, and explained each in detail. He said that Mr. Cross estimated the value of the London Water-Works in 1880 at £33,018,836, exclusive of the landed estates of the New River Company, worth about £4,000,000. Since that time the Companies had increased their capital by £2,000,000; so that, on the same basis, the eight Companies in the Metropolis should be bought out for about £39,000,000. The quinquennial valuation would increase the rateable value of London by about 1½ millions; whereas the average annual addition for the four preceding years was about a quarter of a million. At the very lowest estimate, the new valuation would raise the rateable value for water assessment purposes by between £750,000 and £900,000. Mr. Lidiard (Wandsworth) moved—"That in the opinion of this meeting it is desirable that the water supply of London should be vested in a public representative authority with the least possible delay." Mr. Mark Judge (Paddington) seconded the proposition; and, after some discussion, it was carried unanimously.

The Quinquennial Valuation and the Water-Rates.

A Meeting, convened by the London Liberal and Radical Union, to protest against the increase of the London water-rates under the quinquennial valuation, was held last Thursday evening, at the Memorial Hall, Farringdon Street, E.C.—Mr. R. K. Causton, M.P., presiding. The Chairman said the question before the meeting was one of vast importance to all classes. The total increase in the rateable value of property in London was £1,500,000; and what they wanted was to prevent the

Water Companies from taking advantage of this fact without furnishing any additional supply of water whatever. Resolutions were passed by which the meeting expressed the opinion that the London County Council ought to be the water authority for London, with power to acquire the undertakings of the existing Companies and introduce new supplies; and that before the price to be paid for the works was decided upon, due account should be taken of the quantity and quality of the present supplies, and of the early necessity for the Companies seeking new sources of water. Mr. Causton's Bill (which stands for second reading to-morrow) for preventing the increase of water-rates in London by reason of an increase in the annual or rateable value, except for some adequate reason, received the hearty support of the meeting. A similar meeting, convened by the same body, and presided over by Mr. Causton, was held in the Lambeth Baths, Westminster Bridge Road, on Friday night, at which resolutions to the like effect were passed.

The Profits of the Huddersfield Corporation Gas Department.—The balance-sheet of the Huddersfield Corporation Gas Department for the half year ending Dec. 31 last shows a profit of £3001, which it has been decided shall be transferred to the borough fund. The Gas Committee have recently increased the salaries of the Assistant-Manager (Mr. F. J. Burgess) and the Chief Clerk (Mr. J. Sykes).

Successful Working at the Stoke-on-Trent Gas Works.—In submitting the minutes of the Gas Committee for confirmation at the last meeting of the Stoke-on-Trent Town Council, the Chairman (Mr. Alderman G. Leason) mentioned that he had received a report with reference to the conduct of various gas-works throughout the country during the past year; and he found from this that for every pound invested, Burslem produced 1156·88 cubic feet of gas, Fenton 719·37 feet, Longton 721·85 feet, and Newcastle 872·37 feet; while in Stoke they produced no less than 1204·53 feet, and he considered this was very satisfactory.

The Cambridge Gas Company's Assessment Arbitration.—In the report of the proceedings at the last half-yearly meeting of the Cambridge Gas Company which appeared in the JOURNAL for the 10th ult., reference was made to certain arbitration proceedings arising out of the recent appeal of the Company against an increased assessment of their property. The Arbitrator (Mr. A. Young, of Birmingham) adjudged, without giving any reasons, the total rateable value of the property to be £5469; and ordered the Company to pay their own and the respondents' cost in both the appeal and the reference. Prior to last year the total rateable value was £4747 10s. It was afterwards raised to £7003; but reduced by the Assessment Committee to £5669 on hearing the Company's objections. It was against the rates made on this assessment that the Company appealed to Quarter Sessions (see *ante*, p. 160), and subsequently submitted the matter to arbitration.

Northern Coal Trade.—There has been more movement in the coal trade of the North during the last few days, partly because of the uncertainty as to the working of the collieries, and partly because of the fuller demand for gas coal owing to the fog. Best Northumbrian steam coals are steady in demand at about 11s. 6d. per ton, free on board. Second-class qualities are quiet, at about 10s. 6d.; while small steam coal is dull at 4s. 6d. For gas coal, the demand has been larger—the fog having delayed certain cargoes on passage; while the temporary strike at some of the collieries in the east of Durham has added to the congestion of the trade. The pits, except Silksworth, are now all fully at work again; but notices have been given for some of the Londonderry collieries. It is therefore doubtful how the issue will be. For best Durham gas coal, the price varies; about 10s. 6d. per ton free on board being the medium figure. But some collieries ask 11s.; and it is probable that, in the event of an extensive strike, higher rates would be demanded. Bunker coals are dull, at from 9s. per ton upwards, according to quality; and manufacturing coal appears to be easier. For coke, the supply is more than adequate, and the price is lower—best blast-furnace kinds varying from 17s. 6d. to 19s. per ton, free on board. There is no alteration this week in the price of gas coke.

The Barnsley Electric Lighting Scheme.—At the meeting of the Barnsley Town Council last Tuesday, the Town Clerk submitted the minutes of the Park and Lighting Committee, which contained seven letters which had passed between the Corporation, the Railway Department of the Board of Trade, and the Westinghouse Electric Lighting Company, whose tender to put down plant and light the town had been accepted, but had been since withdrawn by the Company. The correspondence dated as far back as Sept. 29 last year, when the Corporation furnished a description of the proposed system of supply. In the next letter, dated Jan. 10 last, the Board of Trade took exception to the use of overhead wires, and said they were unwilling to approve of them. This objection was withdrawn on the Town Clerk pointing out that tenders were accepted on the understanding that this system had been approved by the Board. The remaining letters had reference to the withdrawal of the tender of the Westinghouse Company. The Town Clerk wrote to know why such a step had been taken. The Company, in a letter from the Secretary (Mr. A. E. Scanes), dated Feb. 2, wrote to say that the general financial aspect of affairs, especially with regard to the Company in America, had so materially changed, that the Directors thought it undesirable to embark at present in such an outlay of capital as would be required to carry out their contract, with no corresponding return of profit. Alderman Blackburn, Chairman of the Committee, moved the adoption of the minutes, and called attention to the letter from the Board of Trade with respect to overhead wires; for if, he said, the Board of Trade insisted on underground wires, the Electric Lighting Order granted to Barnsley by the Board of Trade would be a dead letter. It had occurred to him that it would be desirable to ask the Board whether, in the event of the Council making another contract, they would insist on underground wires. Alderman Marsden seconded the motion. Alderman Brady asked if, supposing the Board would sanction overhead wires, the Committee would seek another contract or abandon the scheme altogether. Mr. Wray said it was the thorough intention of every member of the Committee to proceed with the scheme. The minutes were adopted.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

This week the scene of controversy over the quality of the Edinburgh gas was shifted from the columns of the press—where it has meantime almost died out—to the Council Board of the Gas Commission itself. The Commission met on Monday; and Mr. Kinloch Anderson moved his motion proposing a remit to the Works Committee to consider as to the necessity of selecting a higher average quality of coal when placing new contracts; and also to test the pressure of the gas, and inquire as to the sufficiency of the main and service pipes. Mr. Anderson, who has just been added to the Works Committee, made a moderate speech, and one which does him great credit. He deprecated ungenerous criticism; and denounced a fellow Town Councillor for a remark with reference to the coal contracts, as having an insinuation which was utterly unwarranted. Then he went on to speak of the complaints by the public as to want of illuminating power—on account of which, he said, more jets required to be lighted, and an increase of from 10 to 50 per cent. in gas bills resulted. From this he reasoned that to endeavour to make gas from an inferior quality of coal was entirely false economy. The Commissioners, he thought, were quite justified in increasing the price of gas, but not in decreasing its quality. Bailie Archibald defended the action of the Commissioners; and though he did it vigorously, he rather missed the point by making his remarks a reply to Mr. Anderson and his supporters. His best arguments were towards the beginning, when he stated that the storm arose at first over the price and not the quality of the gas; and then he pointed out that, as a matter of fact, complaints in the last three months of 1890 numbered 254, whereas in the same period in 1889 they numbered 351. Then he collapsed, and went on to speak about the gas being good "if properly burned;" and it was there that the principal weakness of his case lay, because he gave no indication of what he considered to be the conditions of a good burner. He proposed, as an amendment, that before entering into contracts for the supply of coal for the ensuing year, the Works Committee be instructed to consider and report upon—(1) The average price per ton for coal required to maintain the quality of gas at 24 to 26 candles; (2) the average price per ton to give a supply of gas from 26 to 28 candles; and (3) the price required to be charged per 1000 cubic feet for each of the aforesaid standards. Thereafter there was a good deal of talk, most of it of little account; but from this remark must be excepted a speech by Mr. Wells, which dealt in a very sensible manner with several points, and particularly with the one that those who desired to compel the Commissioners to use cannel were merely playing into the hands of the cannel ring. Bailie Archibald's amendment was then interpolated into the centre of Mr. Kinloch Anderson's, and both were a dopted.

If anyone should imagine from all that has been said in his column during the past week or two that there was a falling off in any way of the business of the Commission, the following will, I hope, undeceive them. The Engineers' reports stated that during the month of January there was an output of gas from the Edinburgh works of 132,538,000 cubic feet, or an increase of 15,411,000 cubic feet over the output in January, 1890; and that from the Leith works the output was 48,368,000 cubic feet, a decrease of 8,643,000 cubic feet. Taking both works together, the total increase was 6,768,000 cubic feet. Coal in Edinburgh cost £12,788, as against £7175 in January, 1890; and in Leith £4210, as against £3443. The illuminating power in Edinburgh was 24·10 candles, as compared with 28·12 candles in January, 1890; and in Leith 27·23 candles, as compared with 28·90 candles. The minutes of the Works Committee of the 9th inst. stated that the Commissioners instructed the Engineers to prepare for their next meeting a report as to the sufficiency or otherwise of the gas-mains, gasholders, &c., together with a detailed scheme of any improvements they might have to suggest. The minutes of the Finance Committee stated that the collections for the past month amounted to £26,792; and since Whitsunday last to £152,823. Very elaborate tables by Mr. Mitchell and Mr. Linton were submitted, containing statistics concerning gas manufacture since 1869-70; and then the question of the railway strike was raised. Regarding the latter, a letter from Mr. John Walker, the Genera Manager of the North British Railway, was read, complaining of statements made in a communication to the press by a Commissioner to the effect that the Caledonian Company had given the Commissioners greater facilities during the strike than the North British Company, and pointing out that 58 per cent. of the coal used during that period was from collieries on his Company's lines, while only 29·02 per cent. came over the Caledonian system.

This concluded one of the most satisfactory meetings the Edinburgh and Leith Gas Commissioners have held; but while admitting this, I am also convinced that had they seen their way to give a clear explanatory statement of their position and policy, they would have done better. In these times, the more they can take the public along with them, the easier it will be for them, when they again require to raise the price of gas—which in all probability they will soon have to do—without estranging their customers. Meanwhile, it is satisfactory to know that, in spite of all recent grumblings, the gas industry still flourishes in our midst.

The Lord Provost's Committee of the Edinburgh Town Council on Wednesday considered a remit to them with reference to the quality of the gas. It is reported, they unanimously agreed in condemning it; and resolved to recommend the Council to appoint a Sub-Committee to inquire into the subject, and that a strong representation should be made to the Gas Commissioners with reference to the unsatisfactory quality of the present supply.

The subject of the quality and price of gas has been under consideration in Dundee as well; and on Tuesday last the *Dundee Advertiser* contained the following paragraph: "At a meeting yesterday of a Committee of the Dundee Gas Commission, ex-Provost Brownlee submitted some important statistics, which should be of great service in guiding the members of the Board towards the most economical mode of purchasing coal for the manufacture of gas. The statistics give a list of 75 different kinds of coal; and by comparing the quantity and quality of

gas produced, the value of the coke and secondary products—making allowance for the removal of ash, &c.—some rather remarkable results are ascertained. In some cases, it is said, the coal is worth considerably more than the sum at which it has been tendered, while in other cases—notably the richer kinds—the value is very much overstated, in one instance to the extent of £1 2s. 10d. per ton. One of the outstanding facts brought out by the report is that the purchase of the higher-priced cannels is much more expensive than the judicious use of lower-priced coal, which yields a moderate quality of gas. Mr. Brownlee was thanked by the Committee for the deep interest he takes in the works, and for the preparation of these statistics, the following out of which will lead to the more economical purchase of coal."

The Aberdeen Corporation Gas Committee on Thursday agreed to a proposal by Mr. Alex. Smith, the Gas Manager, to expend £1350 in providing new scrubbers and other additions to the plant in the gas-works.

Mr. Smith has prepared a report on the cost of providing electric light within the compulsory area of the Aberdeen Provisional Order of last year, in which it is stated that the consumers of gas within the district whose yearly accounts are over £5, consume 27⅛ million cubic feet of gas per annum, and to replace that 600,000 units of electricity would be required. On the assumption that one-fourth of these consumers would substitute electric light for gas, 150,000 units of electricity would have to be generated; and Mr. Smith recommends to the Gas Committee that two dynamos, each having capacity for 1000 lights, be obtained. The cost of distributing cables, opening the ground, &c., is estimated at the rate of 32s. per yard. Mr. Smith calculates the total cost of erecting the necessary buildings and laying down the plant at £21,300; while he estimates the annual revenue at £5875—£5626 being the price of 150,000 units of electricity at 9d. per unit, with an additional £250 for meter-rents. The probable annual expenditure is set down at £4556 10s. leaving an estimated profit of £1318 10s. Mr. Smith points out that the cost of electricity supplied to the estimated number of consumers in the compulsory area would be, as already stated, £5875; and that these consumers would receive the same lighting power in gas for the sum of £1359. In the event of the Town Council not proceeding themselves to erect a station, Mr. Smith states a recommendation by Mr. W. B. Eason, of London, that offers from electrical companies should be invited, with a view to one of these companies becoming transferees of the Corporation for the purpose of undertaking all their obligations with respect to electric lighting, a course that has been followed by the Corporation of Glasgow.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

The next meeting of the Town Council of Glasgow sitting as the Gas Trust is expected to be of unusual interest. The recommendation of a Special Sub-Committee (which has since been unanimously approved of by the Gas Committee) to purchase the whole ground, works, and undertaking of the Pollokshaws Gas Company, at a cost of £14,500, has to be considered. But it is not anticipated that there will be much difficulty in getting the Council to approve of the purchase, as a part of the Pollokshaws area of supply is included in the area which it is proposed to take in by the extension of the Glasgow municipal boundaries in the northern suburbs. I may mention that the Pollokshaws Gas Company was started as a private joint-stock concern so far back as the year 1836. It is just possible that the Pollokshaws Gas-Works may by-and-by be discontinued, and that the site of the works may be made use of for a station holder of much larger size, suitable for providing an abundant supply of gas to certain rapidly extending southern suburbs, including the burgh of Pollokshaws itself. Then there is also the proposal to acquire for the city the works, plant, goodwill, &c., of the Partick, Hillhead, and Maryhill Gas Company. Further progress was made with the negotiations in the early part of this week, when a conference was held between the Company's Directors and a Special Sub-Committee of the Corporation Gas Committee. At that conference there was shown a desire on the part of the Gas Company to meet the views of the Corporation, as expressed through their representatives, on the question of price. I am told that the Directors' representatives were not unwilling to abate their price by even more than £30,000; but on the part of the Gas Trust, no hope was held out that more than £200,000 was at all likely to be agreed to when the matter came to be considered by the Town Council in open meeting. Since that conference was held, it has been agreed to hold a special meeting of the shareholders of the Gas Company for the purpose of considering the whole question, and to authorize the Directors as to the minimum price which they are to accept from the Corporation. A feeling has been expressed that the shareholders will not likely yield anything beyond what has been conceded by their Directors at the conference just referred to. But, on the other hand, one of the city representatives at the conference assures me that the question of the whole gas supply of the city and its extensive suburbs may now be considered as having practically been settled. I may remark, however, that the persons who were the shareholders when the purchase negotiations, which were in a state of fair progress in the hands of the ex-Lord Provost (Sir James King) some two or three years ago, were spoiled, have now in a great measure cleared out of their holdings, so that their obstructive tactics may no longer have any weight or influence in preventing the closing of a bargain mutually agreeable to the two negotiating parties. Before passing away from this matter, I ought to state that at the latest stage of the negotiations, it was suggested on behalf of the Gas Company that the price to be agreed upon should be left to the arbitration of the Lord Provost, who is nominally Convener of the Corporation Gas Committee, and an eminent townsman, Sir Charles Tennant, Bart., or to an oversman in the event of a radical difference of opinion eventually blocking the way to a satisfactory settlement. That proposal, of course, was made on the assumption that the Company should be allowed something more than the ultimatum presented on the part of the Gas Trust. Sir C. Tennant, by the way, has recently become a large holder of the Company's stock.

In respect of the allegation that the Pollokshaws Gas Company had still a meter-rent charge, I have to acknowledge the need for the correction made by the Manager (Mr. Adam). How the slip occurred, I cannot explain; but I am bound to admit the mistake, and express my regret that it was made. And here I may correct another mistake in last week's "Notes," but which was not in any way of my own making. The correction has reference to one of the contracts entered into for the extension of the retort-house at Tradeston gas-works; and it is that the contract for the ironwork (roofing, &c.) is to be executed by Messrs. P. and W. Maclellan, of Glasgow, and not by the firm that I named in accordance with the information that I had received from a usually well-informed quarter.

Some progress in the way of putting the terms of the Glasgow Electric Lighting Provisional Order into operation is being made by the Gas Trust's Special Committee on Electric Lighting. Early in the course of this month tenders were asked from electric lighting firms or companies for the compulsory area which is detailed in the Order; and they were to be returned to-day. In the course of this week, however, it was resolved to yield to representations from intending offerers to have the time for returning the tenders extended; and accordingly another fortnight has been granted.

The Police Commissioners of Lockerbie (Dumfriesshire) have intimated to the Secretary of the Lockerbie Gaslight Company that they are willing to buy or to treat for the purchase of the present gas-works of the Company, on terms mutually agreed upon, or to be fixed by arbitration, as provided for in the Burghs Gas Supply (Scotland) Act, 1876.

Scotch pig-iron warrants have fluctuated in price this week between 46s. 9d. and 47s. 1¼d. per ton cash; the closing price yesterday afternoon being 46s. 11¼d. There is almost no business being done on the market just now, owing chiefly to the absence of sellers. In legitimate business, some rather large "lines" in pig-iron have been sold to consumers during the week. There are 16 blast-furnaces in operation, and others are in course of preparation.

There is now a better service of coal waggons on the railways, and consequently the pits are getting fuller employment. Prices have given way during the week in only one instance; and for the time being there does not seem to be any tendency in that direction.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 28.

Sulphate of Ammonia.—Notwithstanding a by no means large turnover, the market remains remarkably steady, and last week's quotations are well maintained. F.o.b. Hull, £10 17s. 6d. and £10 18s. 9d., as in quality, have been paid; and £10 17s. 6d. is now also the lowest price f.o.b. Leith and Liverpool. The hardening tendency of nitrate (to-day's price is 8s. 6d. per cwt.) has so far not had any effect upon the sulphate market; but a further advance is almost certain to reflect upon sulphate values. It will be noticed that nitrate has advanced quite 10s. per ton since the beginning of February, while sulphate is rather lower; and the reduced difference between the values of the two commodities (now only at £2 10s. per ton) may be speedily rectified. There is an improvement in the American demand; and we ought to see a better Continental demand as well.

LONDON, *Feb.* 28.

Tar Products.—There has been no recovery from the falling off mentioned last week in the value of these. Benzols are still very easy at 3s. 4d. for 50's, and 4s. 6d. for 90's; and buyers are holding off in expectation of lower prices. Pitch is also quieter; but there is a good demand for tar oils, and some improvement may take place in these, owing to the large demand from America. Anthracene is slightly firmer; but the price remains as quoted last week. Carbolic still exhibits great weakness; and 1s. 5d. to 1s. 6d. is as much as can be obtained. The value of tar is from 25s. to 28s., according to position. Other quotations are: Pitch, London, 34s. 6d.; country, 32s. 6d. Toluol, 2s. Solvent naphtha, 1s. 9d. Crude naphtha, 1s. 8d. Creosote, 2¼d. Heavy oil, 2¼d. Crude carbolic, 60's, 1s. 6d. Cresol, 9d. Anthracene, "A" quality, 30 per cent., 1s. 3d.; "B" quality, 1s.

Sulphate of Ammonia.—This has not altered much; and the present price ranges from £10 12s. 6d. to £10 16s. 3d. Ammoniacal liquor finds a market at from 5s. 9d. to 7s. 6d., according to position and strength.

Lancaster Corporation Gas Undertaking.—At the monthly meeting of the Lancaster Town Council last Wednesday, the accounts of the Gas Department for the past half year, together with a report by the Gas Manager (Mr. C. Armitage), were presented. In the latter it was mentioned that the increase in the quantity of gas made was 19·19 per cent., and that the comparative statement revealed the fact that an increase in the profit would be realized at the end of the financial year (June 30 next), notwithstanding the increased cost of coal, material, and labour. Mr. Armitage recommended certain extensions at the works, which he estimated would cost £2280. After considerable discussion on the proceedings of the Committee, they were approved, with the exception of a resolution with reference to the keeping of the gas accounts. A longer report will be published in the JOURNAL next week.

Electric Lighting of the City.—At the meeting of the Commissioners of Sewers last Tuesday, the Streets Committee laid before the Commission a letter from the Board of Trade intimating that they were satisfied that the Brush Electrical Engineering Company was in a position to discharge the duties and obligations imposed upon them by the City of London (Brush) Electric Lighting Order, 1890. Mr. Morton, M.P., asked whether the Commission were dealing with the two Companies with whom they had contracted in regard to the electric lighting of the City, or with the Company of which the Lord Mayor was Chairman. The Chairman said that, as he understood the matter, they had nothing whatever to do with the latter Company. At a later stage of the proceedings, a letter was read from the Board of Trade, enclosing the copy of a letter they had received from the Laing, Wharton, and Down Construction Syndicate, on the subject of the Syndicate. The letter stated that the Board, as at present advised, were unable to express themselves as satisfied with the financial position of the undertakers to whom it was proposed to refer the undertakings; and they wished to have the views of the Commissioners on the subject.

Electric Lighting by Gas Companies on the Continent.—According to a correspondent of the *Electrical Review*, the negotiations between the city of Budapesth and the local Gas Company, which have already lasted for more than a year, have at last reached a stage which seems to justify the hope that no further difficulties will stand in the way of the introduction of the electric light supplied from a central station. The Company have acceded to the last demands of the city, with the exception of two points, which contained stipulations too onerous. It now only remains for the city to declare itself satisfied with the valuable concessions obtained, which in the position of affairs may be justly expected, for the Municipality of the capital will at last obtain the right to grant concessions for the erection of electrical works, applications for which were submitted some time ago.

An Augmented Water Supply for Barnsley.—At last Tuesday's meeting of the Barnsley Town Council, the Water Committee reported that a deputation from the Dewsbury and Heckmondwike Water Board had had an interview with them with reference to furnishing a supply of water to Barnsley from their Broadstone reservoir. The Board were prepared to enter into an agreement to supply the Corporation for a term of fifteen years with a minimum quantity of 20 million gallons of water per annum, at the rate of 200,000 gallons per day on 100 consecutive days, commencing on July 1 in each year, and a maximum quantity of 40 million gallons of water per annum, at the rate of 200,000 gallons per day on 200 consecutive days, commencing on July 1 in each year, at the price of 7½d. per 1000 gallons; and the Committee recommended the Council to enter into an agreement accordingly. Alderman Brady, Chairman of the Water Committee, moved the adoption of the minutes. He said that the whole essence of the thing was that their own water supply was insufficient for carrying on the supply of the borough and several other out-townships connected with it. The Broadstone reservoir was constructed near to their own; and they should have the water sent into the tanks, and delivered in the same state as received. The report was adopted.

Beyrout Water-Works Company, Limited.—The annual meeting of this Company was held last Tuesday, at the London Offices, 17, King's Arms Yard, E.C. The report submitted by the Directors showed that the gross revenue for the year amounted to £12,282, as against £11,997 for the previous year. After making proper allowances for proportion of cost for new machinery and depreciated value of stores, and carrying £1000 to the reserve for contingencies, a net balance remained of £6842. The Resident Engineer reported that the works had been maintained generally in thorough working order, and that, but for the erection of the last new machinery, it would have been very difficult to keep up the supply of water during the drought of the past year. The large main running from the pumps to the city, it was also stated had always been a source of anxiety to the Directors; and they were now considering the question of relaying those portions which were defective. The Chairman (Mr. Edward Easton), in moving the adoption of the report, said that the business of the Company was steadily increasing. The amount that unfortunately still had to go to the debit was getting less every year. In 1885 the balance was about £4000 to the bad; while in the past year it was £1700. This, however, was not very satisfactory to the shareholders; but the Board hoped for better times. Mr. J. Staniforth seconded the motion, which was carried.

Extensions at the Colne Gas-Works.—On Thursday, the 19th ult., the extensions which it has been decided to carry out at the Colne Local Board Gas-Works, from the designs and under the superintendence of the Engineer and Manager (Mr. H. Simmonds, F.C.S.), were formally commenced by Mr. J. Hartley, the Chairman of the Gas Committee, laying the foundation-stone, in the presence of the members and officials of the Board. The work now started is that for which the Local Government Board lately sanctioned the raising of £22,000; and the portion initiated is the retort-house and coal-store. This building will be in two sections, each 151 ft. 6 in. long. The retort-house will be 38 ft. 4 in. wide and 33 feet high (18 feet to the stage-floor), and will accommodate twelve settings of eight retorts, 22 in. by 16 in. in diameter, heated on the regenerative principle. Its producing capacity will be 725,000 cubic feet per 24 hours, or about double the daily production of the existing works last year. The charging and drawing will be done by machinery; and the coke will pass down shoots direct into the vaults, from which it will be loaded into carts without the assistance of wheelers. The coal-stores are to be 30 feet wide, and capable of holding 2000 tons of coal. The cost of the entire building is estimated at £1200. At the close of the formal proceedings the company were entertained by the contractors (Messrs. J. and M. Hawley. Several interesting addresses were given; Mr. Hartley referring specially to the great increase which has taken place in the consumption of gas at Colne during the past ten years.

The Public Lighting of Camberwell.—In the JOURNAL for Jan. 20 last (p. 122) we noticed the proceedings at the meeting of the Camberwell Vestry on the preceding Wednesday, when the General Purposes Committee reported upon the quality of the gas supplied in the parish by the South Metropolitan Gas Company, and recommended, among other things, that the attention of the Company should be called to the number of lamps that had been unlighted in the previous six weeks, and asking for a rebate of £400 on the account for the current quarter. A letter was accordingly addressed to the Company, whose Secretary (Mr. Frank Bush) replied that the Directors were quite unable to allow the deduction suggested. The letter was referred to the Committee, who had before them Mr. Howard, the Company's Chief Inspector, who stated that they had incurred an expense of 7s. 6d. per lamp in opening the ground where it was frozen, and that the average cost of the gas consumed was about 1d. a night—the remainder of the charge being for repairing, cleaning, and lighting. He added that the Company had really been working at a loss. At the meeting of the Vestry last Wednesday, the Committee reported their proceedings, and recommended that, having regard to the full and satisfactory explanation given by the Company, no further action should be taken in the matter. Mr. Dowton protested against the Committee playing fast and loose with the Vestry. If they thought their claim was a just one, they ought to stand by it. Mr. Wallace said the Committee were perfectly satisfied with the explanation they had received from the Company. The recommendation was adopted.

Proposed Purchase of the Rhyl Gas-Works by the Local Authority.—A special meeting of the Rhyl Improvement Commissioners was held last Thursday, to consider a resolution passed by the General Purposes Committee to the effect that notices should be served on the Rhyl Gas Company of the willingness of the Commissioners to purchase the Rhyl gas undertaking in accordance with section 34 of the Rhyl Improvement Act, 1852. The recommendation was unanimously adopted; and a deputation was appointed to give evidence before the Committee of the House of Commons, in opposition to the Bill promoted by the Company.

Shocking Death of a Coke Wheeler at Blackburn.—An inquest was held last Friday at Blackburn on the body of a labourer named Rorke, who had met with his death under extraordinary circumstances at the gas-works of the Corporation. It appears that the unfortunate man had been doing an unusually long spell of work as a coke wheeler, owing to a change of shifts; and he was found lying on his back, with the burning coke upon him, in a rather narrow passage through which he had to pass to the coke-yard. It was supposed that the barrow must have caught against the side of the passage and overturned. A verdict of "Accidental Death" was recorded.

Tottenham and Edmonton Gaslight Company.—The half-yearly meeting of this Company was held last Saturday at Tottenham, when on the motion of the Chairman (Mr. G. Gripper), seconded by Sir Henry Cartwright, the report and accounts, which were noticed in last week's issue, were adopted; and, on the motion of Mr. Corbet Woodall, seconded by Mr. Doe, dividends at the rate of 11½ per cent. per annum on the "A" stock, and of 8½ per cent. on the "B" and "C" stocks, were declared. The proceedings on this occasion were exceptionally interesting. It appears that after the previous meeting several influential proprietors expressed a desire to have some permanent memorial of the services the Chairman had rendered to the Company. A Committee was formed; and they resolved to have his portrait painted for the Board-room. This has been done; and at the meeting on Saturday, it was unveiled, on behalf of the subscribers, by Sir H. Cartwright, who, in the course of his remarks, stated that the funds would permit of a replica being prepared for presentation to Mrs. Gripper. A report of the proceedings will be given next week.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 391.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share.	Closing P.T. 6th.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	10 Oct.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	,,	7½	Do. 7 p.c	10	12—13	..	5 15 6
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	15—17	..	9 8 5
200,000	5	13 Nov.	7½	Bombay, Limited	5	6¾—7¼	..	5 3 5
40,000	5	,,	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	212—217*	+5	5 12 10
125,000	,,	,,	9½	Do. New	100	153—158*	+½	5 17 1
220,000	20	11 Sept.	11½	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	28 Mar.	11½	British	20	43—45	..	5 0 0
50,000	10	11 Sept.	11	Bromley, Ordinary 10 p. c.	10	19—21	..	5 4 9
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	10—11	—½	5 9 1
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	100—103	..	5 16 7
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27*	..	5 18 6
550,000	Stck.	10 Oct.	13½	Commercial, Old Stock	100	253—258	..	5 6 7
130,000	,,	,,	10½	Do. New do.	100	198—203	..	5 5 11
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	120—125	+3	3 12 4
557,320	20	30 Dec.	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	,,	13	Do. New '69 & '72	14	32½—33½	..	5 8 5
200,000	20	,,	10	Do. 7 p. c. Perf.	20	37—39	..	5 2 6
75,000	Stck.	25 Sept.	10	Crystal Palace District	100	195—205	..	4 17 7
486,090	10	28 Jan.	4†	European, Limited	10	19—20	..	—
354,060	10	,,	4†	Do. Partly paid	7½	13½—14½	..	—
5,470,630	Stck.	12 Feb.	13	Gaslight & Coke, A, Ordinary	100	239—244	+2	5 6 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	96—99	..	4 0 10
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	247—252	..	3 19 4
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	118—123	..	4 1 3
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	174—179	..	4 3 9
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	161—165	..	4 4 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	246—251	+1	3 19 8
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	146—151	..	3 19 5
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113—118	..	3 7 10
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—126	..	3 11 5
908,000	,,	,,	6	Do. 6 p. c. do	100	165—170	..	3 10 6
3,800,000	Stck.	13 Nov.	12	Imperial Continental	100	225—230	+1	5 4 4
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	5—5½	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	112—115	..	4 6 11
541,920	20	27 Nov.	6¼	Monte Video, Limited	20	18—19	..	6 16 10
150,000	5	27 Nov	10	Oriental, Limited	5	8¾—9¼	..	5 8 1
60,000	5	25 Sept.	7	Ottoman, Limited	5	5—5⅛	..	6 7 3
166,870	10	26 Feb.	2	Pará Limited	10	3½—4½*	..	—
420,000	100	3 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	95—100	..	6 0 0
500,000	100	1 Dec.	16	2nd Do.	100	93—98	..	6 2 5
150,000	10	10 Oct.	10	San Paulo, Limited	10	16—17	..	5 17 8
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	275—280*	+2½	5 10 8
1,350,000	,,	,,	12	Do. B do.	100	225—230*	+1	5 4 4
166,500	,,	,,	13	Do. C do.	100	230—235*	..	5 10 3
678,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	140—145	..	3 9 0
60,000	5	11 Sept.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
						*Ex div.		
				WATER COMPANIES.				
729,221	Stck.	30 Dec.	10	Chelsea, Ordinary	100	269—274	..	3 13 0
1,720,560	Stck.	10 Oct.	7½	East London, Ordinary	100	217—221	—1	3 7 10
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	140—145	..	3 2 0
700,000	50	12 Dec.	9	Grand Junction	50	130—135	..	3 12 0
708,000	Stck.	12 Feb.	10½	Kent	100	275—280	+2	3 15 0
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	254—259	+1½	3 13 4
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
260,000	Stck.	25 Sept.	4	Do. 4 p. c. Deb. Stk.	100	121—126	..	3 3 6
500,000	100	12 Feb.	12½	New River, New Shares	100	355—360	..	3 7 4
1,000,000	Stck.	28 Jan.	4	Do. 4 p. c. Deb. Stk	100	125—128	..	3 2 6
902,300	Stck.	12 Dec.	7	S'thwk & V'xhall, 10 p. c. max.	100	174—178	..	3 18 7
126,500	100	,,	7	Do. 7½ p. c. do.	100	167—172	..	4 1 4
1,155,066	Stck	12 Dec.	10	West Middlesex.	100	265—270	..	3 14 1

† Interim dividend.

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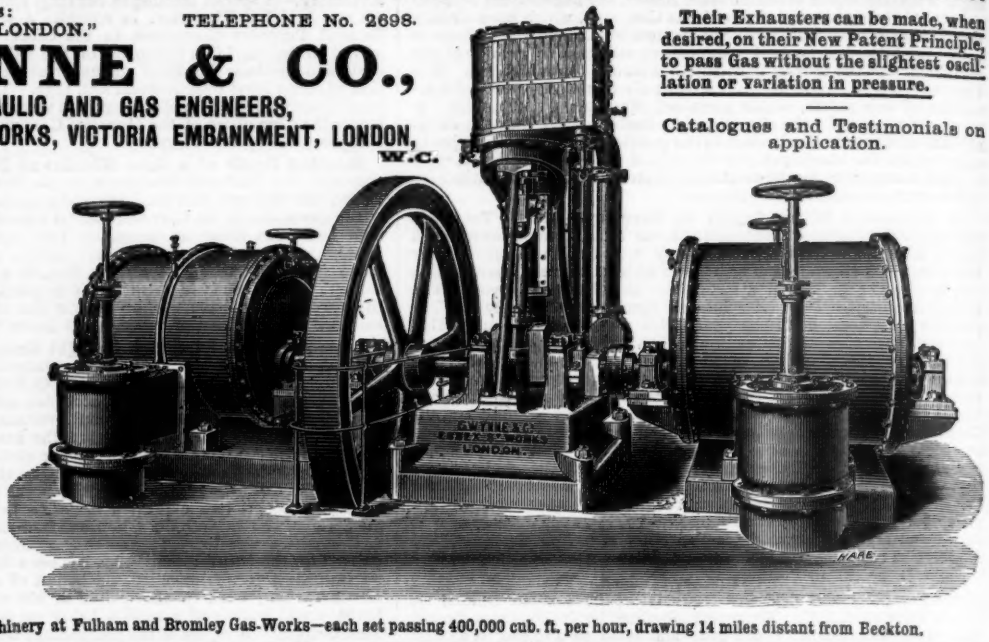

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantity at highest market prices, or contracts for the year.
For prices and terms apply Botolph House, Eastcheap, LONDON, EC.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 85, Gracechurch Street, LONDON; 70, Wellington Street, GLASGOW; 58, Fountain Street, MANCHESTER; and 96, Reade Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

MR. ALFRED KITT, Civil Engineer, 5, VICTORIA STREET, WESTMINSTER (for 27 years with The Gaslight and Coke Company, and late Engineer of the Pimlico and Westminster Stations), having retired from the Service, is now prepared to ADVISE GAS COMPANIES on Structural Alterations, Designs for New Works, and assist in Parliamentary Proceedings. Patentee of New Inclined Retorts. Special Oil-Gas Plant.

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

WANTED, a Situation as Manager or ASSISTANT MANAGER of Gas-Works. Thoroughly conversant with the Manufacture and Distribution of Gas, also Office Work. Good References. Aged 31.
Address R. W. BRETT, jun., Gas-Works, HERTFORD.

GERMAN REPRESENTATIVE.

WANTED, a Gentleman of experience to take the Management of an established Business of considerable dimensions in Germany connected with Gas Engineering. None but first-class men need apply.
Address, with full particulars, No. 1918, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 20, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 426 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 421.
Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

WANTED, an Assistant Manager for a Provincial Gas-Works making 130 millions per annum. Must be a good Carbonizer, and experienced in the Management of Men, the Manufacture of Sulphate, and the usual routine of a Gas-Works. House, Coal, and Gas provided.
Apply, by letter, stating salary required, and enclosing *copies only* of testimonials, to No. 1915, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., not later than March 14, 1891.

WANTED, to purchase, a 7 or 8 horse power "OTTO" GAS-ENGINE (second hand).
Address No. 1903, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

METER.

WANTED, a Second-Hand Station METER to pass 1500 feet per hour. Must be in good working order.
State price to JOHN DAVIES, Victoria Brewery, Burton Salmon, YORKSHIRE.

PURIFIERS.

WANTED, two Second-Hand Purifiers, 6 feet square, with Centre-Valve, Connections and Lifting Apparatus complete.
State price and full particulars to JOHN DAVIES, Victoria Brewery, Burton Salmon, YORKSHIRE.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

HUTCHINSON BROTHERS, Barnsley Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

BENTLEY & CO.

MANCHESTER ELECTRICAL STORES.

FOR Batteries, Bells, Wires, and Special Electrical Apparatus, address the best house
17, NEWTON STREET, PICCADILLY, MANCHESTER.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

WANTED, a small Oxide of Iron PURIFIER, with Wood or Iron Grids.
State size and price to WM. BROTHERS, Carbonate and Liquor Ammonia Manufacturer, Rawtenstall, LANCASHIRE.

WANTED, to purchase Gas Carbon delivered at nearest Station to Gas-Works, in quantities of not less than 4 tons.
Address stating price per ton and quantity, No. 1766, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two Purifier "Lifting Travellers" for 12 feet Square Boxes. Equal to new. Messrs. Cookey and Sons makers.
Apply to the GAS-WORKS, JERSEY.

ON SALE—Gas Coals and Nuts. Prompt Delivery.
Apply to the MADELEY COAL AND IRON COMPANY, LIMITED, Madeley, NORTH STAFFORDSHIRE.

RUGBY GAS-WORKS.

FOR SALE—A Second-Hand Exhauster (Anderson's Patent), with 10-inch Bye-Pass and Connections, capable of passing about 15,000 cubic feet per hour; also Boiler, &c. Has been at work till this season, and may be seen at Rugby.

Particulars may be obtained from Mr. P. SIMPSON, the Manager.

FOR SALE—One Single Gasholder, 80 feet diameter by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.

Also four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep; 12-inch Centre-Valve and Connections.

Would erect the above, and make practically equal to new.

Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.

Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

NOTICE TO GAS COMPANIES AND TAR DISTILLERS.

GASHOLDER FOR SALE.

THE Perth Gas Commissioners have FOR SALE a TWO-LIFT GASHOLDER, which is to be removed to make room for Extensions. The Gasholder when full will contain 138,000 cubic feet. The Tank is of Cast Iron, and is 66 ft. 9 in. diameter inside by 21 ft. 3 in. deep. It can be dispensed with at once. It was erected in 1872 by Henry Balfour and Co., of Leven, and is in good working order, with Cast-Iron Columns, Wrought-Iron Girders, Pulleys, Chains, and Balance-Weights complete, including Inlet and Outlet Valves.

Offers will be entertained for the Cast-Iron Tank alone, and also for the Gasholder, including Columns, Girders, Balance-Weights, Chains, and Valves separately, or for the whole as it stands.

Offers to be addressed to WILLIAM MACLEISH, City Clerk, on or before the 14th of March, 1891.

TO IRONFOUNDERS AND OTHERS.

TENDERS are invited by the Directors of the Torquay Gas Company for the supply of about 600 tons of CAST-IRON MAIN-PIPES, delivered at Torquay.

Copies of the specification and forms of tender can be had on application to the Engineer, Mr. R. Beynon, Gas-Works, Hollacombe, Paignton, on payment of the sum of One Guinea, which will be returned on receipt of a *bond fide* tender.

Sealed tenders, on the forms provided, endorsed "Tender for Cast-Iron Pipes," are to be sent to the Chairman of the Torquay Gas Company, on or before noon of Thursday, March 5 prox.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
J. KITSON, Secretary.

Torquay, February, 1891.

EDINBURGH AND LEITH CORPORATIONS GAS.

THE Commissioners invite Tenders to supply GENERAL STORES (Coals, Lime, Pipes, Paints, &c., &c.) required at their Works in Edinburgh and Leith during the year from May 15 next.

Tender forms and all information can be had on application to the Engineers at these Works.

Offers must be lodged not later than Ten o'clock on Friday forenoon, the 13th of March, in sealed envelopes, addressed to the undersigned.

The Commissioners are not to be bound to accept the lowest or any tenders.

JAMES MC G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
March 2, 1891.

TENDERS FOR LIGHTING BY GAS THE CITY OF BELEM, PARA, UNITED STATES OF BRAZIL.

BY order of the Board of the Municipal Administration of Belem of Gram Parà, TENDERS are invited.

A copy of the particulars published by order of the said Board can be had on application to the Brazilian Legation, 35, Piccadilly, London; or to the Brazilian Consulate General, 6, Great Winchester Street, London, E.C.

Tenders must reach the Offices of the Board of Administration at Belem do Gram Parà not later than the 19th day of July of the current year.

BOARD OF POLICE OF GREENOCK.
(GAS COMMITTEE.)

TENDERS FOR GASHOLDER.

THE Gas Committee invite Tenders for the Supply and Erection of a TELESCOPIC GASHOLDER in two Lifts (lower Lift, 122 feet diameter by 25 feet deep), in accordance with Plan and Specification to be seen on application to Mr. S. Stewart, Engineer, Gas-Works, Inchgreen, near Port Glasgow.

Copies of the specification can be obtained from the undersigned on deposit of Ten Shillings, which will be returned on receipt of a *bond fide* offer.

Tenders, endorsed "Tender for Gasholder," to be lodged with the subscriber, on or before the 7th of March, 1891.

The lowest or any tender may not be accepted.

JNO. CHALMERS, Clerk.

Gas Office, Municipal Buildings,
Greenock, Feb. 26, 1891.

LYMM LOCAL BOARD.

TENDERS FOR TELESCOPING GASHOLDER.

THE Lymm Local Board are prepared to receive TENDERS for the TELESCOPING OF A GASHOLDER at their Gas-Works in Lymm.

Specifications of the same and all particulars can be had on application to Mr. William Severs, the Gas-Works Manager.

Sealed tenders, marked "Tender for Telescoping Gasholder," and addressed to the undersigned, must be delivered on or before the 11th day of March, 1891.

The Board do not bind themselves to accept the lowest or any tender.

W. MULLARD,
Clerk to the Board.

Local Board Offices, Lymm,
Cheshire, Feb. 25, 1891.

CORPORATION OF LEICESTER.

CHEMICAL WORKS, AYLESTONE ROAD.
CONTRACT No. 29.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the Manufacture, Delivery, and Erection of one CAST-IRON TANK, 50 feet diameter by 11 feet deep; also for the Supply and Delivery of CAST AND WROUGHT IRON TANKS, PITCH AND ANTHRACENE COOLERS, WORM-PIPES, STILL-HEADS, &c., at their Chemical Works, Aylestone Road.

Drawings may be seen, and specification and form of tender obtained upon application to the Engineer, and on payment of the sum of £5, which will be returned upon receipt of a *bond fide* tender.

Tenders, addressed to Councillor Lennard, Chairman, and endorsed "Tender for Cast-Iron Tanks, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Friday, March 6 prox.

The Committee do not bind themselves to accept the lowest or any tender, or to place the whole of the order with any one firm.

ALFRED COLSON, M. Inst. C.E.,
Engineer and Manager.

Gas Offices, Millstone Lane,
Leicester, Feb. 19, 1891.

TENDERS FOR TAR.

THE Wellingborough Gaslight Company, Limited, invite TENDERS, on or before March 10, for the purchase of the TAR now in Stock, and the surplus make for One, Two, or Three years.

Particulars on application to Mr. S. H. KIMBELL, the Secretary.

TENDERS FOR FIRE-CLAY GOODS.

THE Hinckley Local Board invite TENDERS for the above.

Forms of tender and further particulars may be obtained from the undersigned, to whom sealed and endorsed tenders are to be sent on or before March 9.

E. H. MILLARD,
Manager.

CITY OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive on or before Thursday, the 26th of March next, OFFERS of High-class CANNELS and COALS, suitable for Gas Making, for delivery at their Gaythorn' Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three years, commencing the 1st of July, 1891.

Particulars and printed forms of tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee.
WM. HENRY TALBOT, Town Clerk.

Town Hall, Manchester,
Feb. 27, 1891.

COUNTY BOROUGH OF WIGAN.

THE Gas Committee invite Tenders as follows:—

Contract No. 1, Cast Mains and Connections.
" No. 2, Wrought-Iron Tube and Fittings.
" No. 3, Brass Tube and Fittings.
" No. 4, Lead Pipe and Pig Lead.
" No. 5, Wet and Dry Gas-Meters.

The contracts will be for One Year commencing on the 1st of April next, and ending on the 31st of March 1892.

Forms of tenders to be obtained from the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

Tenders, sealed, and endorsed with the name of Articles tendered for, to be delivered to the Town Clerk, Town Hall, Wigan, on or before Monday, the 16th of March next.

JOS. TIMMINS, Engineer.

Gas-Works, Wigan,
Feb. 20, 1891.

CORPORATION OF BANGOR.

TENDERS wanted for the following:—

Plans, with Tender, for a Slate-Covered Iron Retort-House Roof, to cover House 105 ft. by 43 ft. inside.

Plans, with Tender, for a Boiler or Still, capable of extracting all the Ammonia from 3 tons of Liquor in 24 hours.

No. 2 Contract—Tender for 36 Clay Retorts, and 30,000 Fire-Bricks, &c., of best quality.

No. 3 Contract—For Skilled Labour to set 36 Retorts.

No. 4 Contract—Hydraulic Main, &c.

No. 5 Contract—For 36 Mouthpieces, with Self-Sealing Lids.

No. 6 Contract—For a Revolving Washer, capable of extracting all the Ammonia from 250,000 cubic feet of Gas in 24 hours.

Plans and specifications may be seen, or further information obtained, at the Office of the undersigned, to whom tenders must be sent on or before the 26th day of March, 1891.

The Committee do not bind themselves to accept the lowest or any tender.

JOHN SMITH,
Engineer and Manager.

Gas-Works, Bangor, Feb. 26, 1891.

C. & W. WALKER.

GASHOLDERS; PURIFIERS; PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

RETORT MOUTHPIECES; CONDENSERS;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SLIDE VALVES; TAR BURNERS; &C., &C.

WOOD SIEVES.

ADDRESSES: 8, Finsbury Circus, London, E.C.; Midland Iron-Works, Donnington, near Newport, Shropshire.

"FORTRESS LONDON." "FORTRESS DONNINGTON."—Telegraphic.

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Padiham and Hapton Local Board invite TENDERS for the purchase of the SURPLUS TAR and AMMONIACAL LIQUOR to be produced at the Gas-Works during the year ending March 25, 1892.

Sealed tenders, addressed to the Chairman, Gas Committee, Local Board Offices, Padiham, must be sent to me not later than Tuesday, March 10, 1891; and for particulars apply to the undersigned.

J. R. SMITH,
Clerk to the Board.

Padiham, Feb. 18, 1891.

COUNTY BOROUGH OF BOLTON.

THE Gas Committee invite Tenders for IRONWORK required for Eighteen Through Arches of Retorts, comprising 252 Mouthpieces, Buckstaves, Lattice Girders, Hydraulic and Foul Mains, and other Ironwork.

Drawings and specifications can be seen at the Lum Street Gas-Works, on application to Mr. Wm. Smith, Engineer and Manager.

Tenders, sea'ed, and endorsed "Retort-Mountings," to be sent to the Chairman, Alderman J. Miles, J.P., Gas Offices, Bolton, on or before March 18 next.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
R. G. HINNELL, Town Clerk.

Town Hall, Bolton, Feb. 27, 1891.

SOUTH METROPOLITAN GAS COMPANY.

SIX-LIFT GASHOLDER.

THE Directors invite Tenders for a GASHOLDER of Six Lifts of 80 feet each. Diameter of outer lift, 300 feet. Contents, about 12 million cubic feet.

Specification and drawings can be obtained on application to the Chief Engineer, on payment of the sum of Three Guineas.

The Holder must be completed and ready for use by the 1st of October, 1892.

Proposals to be sent in on or before Tuesday, the 24th of March, addressed to the undersigned, and endorsed "Tender for Gasholder."

The Directors do not bind themselves to accept the owest or any tender.

By order,
FRANK BUSH, Secretary.

South Metropolitan Gas Company,
709A, Old Kent Road, S.E.,
Feb. 27, 1891.

GLASGOW CORPORATION GAS.

THE Corporation of Glasgow are pre- pared to receive TENDERS for—

1. Three sets of Four Purifiers, each 35 feet square, to be erected at their Dalmarnock Gas-Works; and
2. Two sets of Four Purifiers, each 25 feet square, to be erected at their Dawsholm Gas-Works.

The drawings may be inspected and copies of the specification and forms of tender obtained, on application to the Engineer, 45, John Street, Glasgow, on and after Monday, the 2nd prox., upon payment of One Guinea.

Sealed offers, endorsed "Tender for Purifiers," and addressed to the subscriber, will be received by him on or before Tuesday, the 10th prox.

The Corporation do not bind themselves to accept the lowest or any offer.

J. D. MARWICK,
Town Clerk.

Ci'y Chambers, George Square,
Glasgow, Feb. 26, 1891.

SOUTH METROPOLITAN GAS COMPANY.

£22,000 Five per Cent. Perpetual Debenture Stock, and £33,500 Ordinary "C" Stock of the above Company, presenting investments of the soundest description

MESSRS. G. A. WILKINSON & SON are instructed by the Directors to SELL BY AUCTION, at the Mart, on Friday, March 6, at Two precisely, in numerous Lots, to suit large and small purchasers £22,000 FIVE PER CENT. PERPETUAL DEBENTURE STOCK and £33,500 ORDINARY "C" STOCK of the South Metropolitan Gas Company.

The Districts supplied by the Company comprise nearly the whole of the South of London, from Wandsworth to Plumstead Marshes; and the demand has so much increased that the supply of Gas has been nearly doubled within the last Ten years.

Particulars may be had of FRANK BUSH, Esq., Secretary to the Company, 709A, OLD KENT ROAD; of Messrs. BUDD, JOHNSONS, AND LECKE, Solicitors, 24, AUSTIN FRIARS; and of the AUCTIONEERS, 7, Poultry, CITY.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

PATENTS FOR INVENTIONS,
REGISTRATION OF TRADE MARKS and DESIGNS in all Countries.

SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*

J. C. CHAPMAN,
Assoc.M.Inst.C.E., M.Inst.M.E., Fel. Inst. Patent Agents,
70, CHANCERY LANE, LONDON, W.C.

Special experience in Gas and Ammonia Plant.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**
ADDRESS
JAMES WHITE & Co.,
ALBERT WORKS, WIDNES.

COKE BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE BEST AND SIMPLEST SYSTEM OF

VALVES FOR PURIFIERS

Is Weck's Patent arrangement of Three-Way Disc Valves, either separate for Purifiers fixed in line, or arranged together as a

CENTRE-VALVE

When the Purifiers are fixed in square.

No Leakage. No Foul Gas passed in changing. All the Purifiers in action, or any less number. Clean Box emptied of Air before taking into use.

DESCRIPTIVE PAMPHLET ON APPLICATION.

F. WECK,
JOHN BRIGHT ST., BIRMINGHAM.

TAR AND LIQUOR PURCHASED.

JOHN CLARKSON MAJOR,
(Established 1851,)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.
SCULCOATS, HULL.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

CAST-IRON PIPES
FOR GAS AND WATER.
Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.
VALVES
FOR GAS, WATER, AND STEAM.
TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

THOMAS TURTON
AND SONS, LIMITED,
Sheaf & Spring Works,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
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PARIS DEPOT: 3, BOULEVARD DE BELLEVILLE.

Price 3s. 6d. post free (76 Pages, Demy 8vo., Limp Cloth),
THE
VALUATION OF GAS-WORKS FOR ASSESSMENT,
By THOMAS NEWBIGGING, M. Inst. C.E.,

With an Appendix containing a Statement of the most Important Cases bearing on the Question, and decided by the Superior Courts. Each of these is preceded by a Digest; and the Judgments are given in full.

Price: Morocco, Gilt, 18s.; Cloth, 15s.; Delivered Free.
THE FIFTH EDITION OF THE
HANDBOOK
FOR
Gas Engineers and Managers,
BY
THOMAS NEWBIGGING, M. Inst. C.E.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

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Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

Shipments Promptly and Carefully Executed.

SOOTHILL WOOD CANNEL.

Yield of Gas per Ton, over 12,000 Cubic Feet.
Illuminating Power - - - - - 26 Candles.
Coke per Ton, - - - - - - - 57 per cent. of a quality almost equal to that made from the best Coking Coal.

For Analysis and Price, apply to

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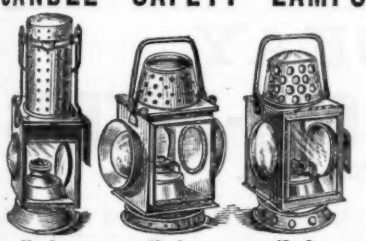

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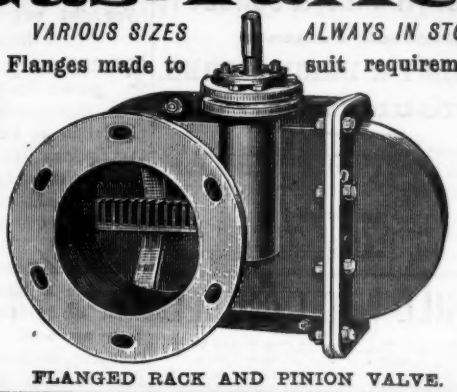

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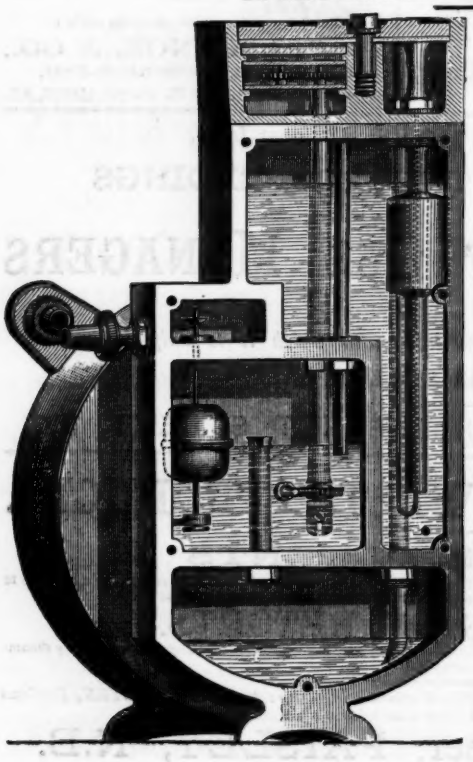

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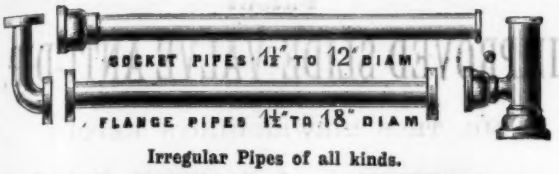

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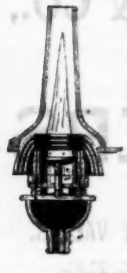

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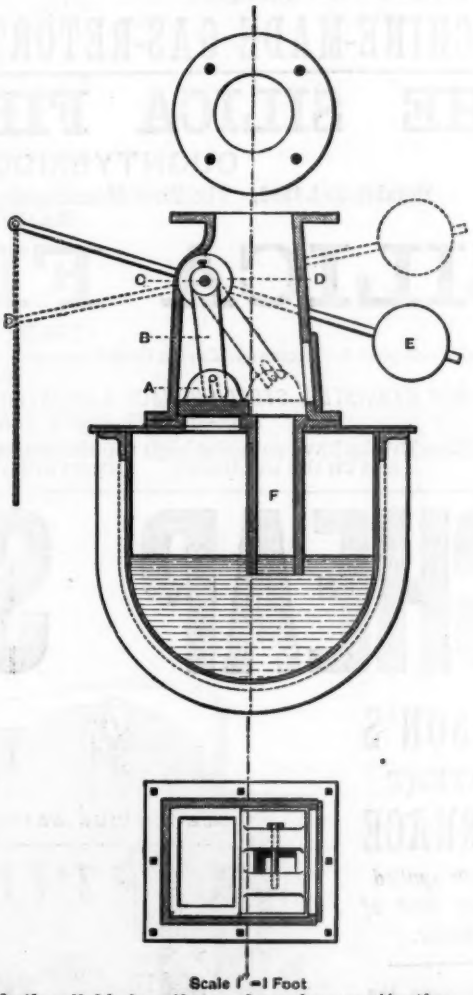
IMPROVED SLIDE-VALVE ANTI-DIP.

MR. THOS. NEWBIGGING'S REPORT.

5, Norfolk Street, Manchester, Dec. 11, 1889.

Sir,—I have examined your patent Anti-Dip arrangement, and have seen it at work on the Retort-Benches, at the Longwood Gas-Works, and the opinion which I have formed of its simplicity and certainty in working is distinctly favourable; so much so *that I consider it to be, without exception, the most efficient Appliance of the kind which has yet been introduced.* It can be applied to existing Benches with great ease, and at a minimum cost. So far as I am aware, it embodies a principle of action not previously applied in this direction.—Yours truly,

THOS. NEWBIGGING.



Scale 1" = 1 Foot

Is perfectly reliable in action, and requires no attention.
Has all the advantages of the Dip and Anti-Dip combined.
Is cheap, and easily fixed to any form of main.
Will more than save their cost in one season's working.

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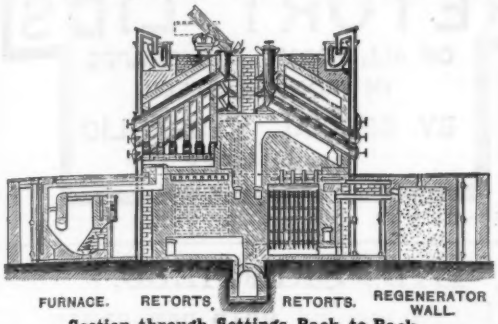
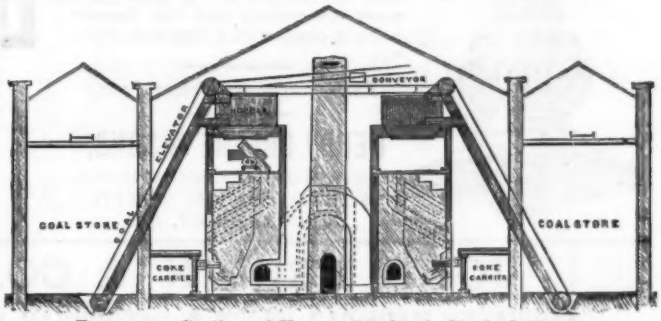
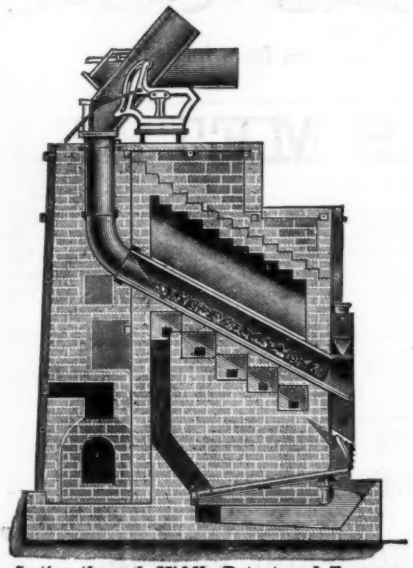
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.



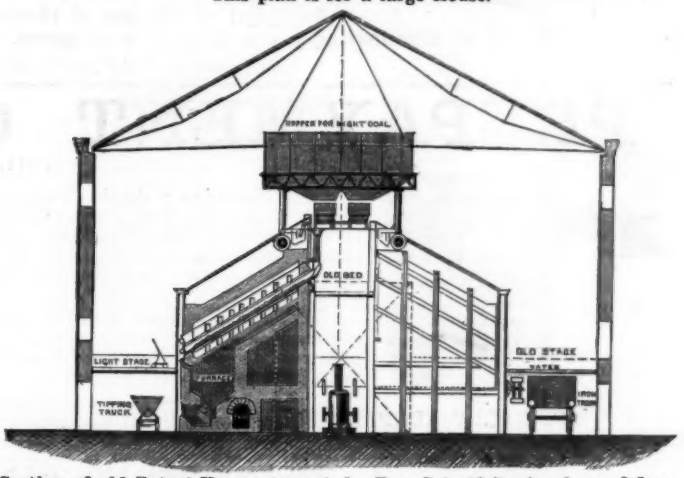
Section through Settings Back to Back. Working off ground floor with Generator under Stage and Regenerator under the Sets.



Transverse Section of House with Coze's Single Settings, Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic. This plan is for a large House.



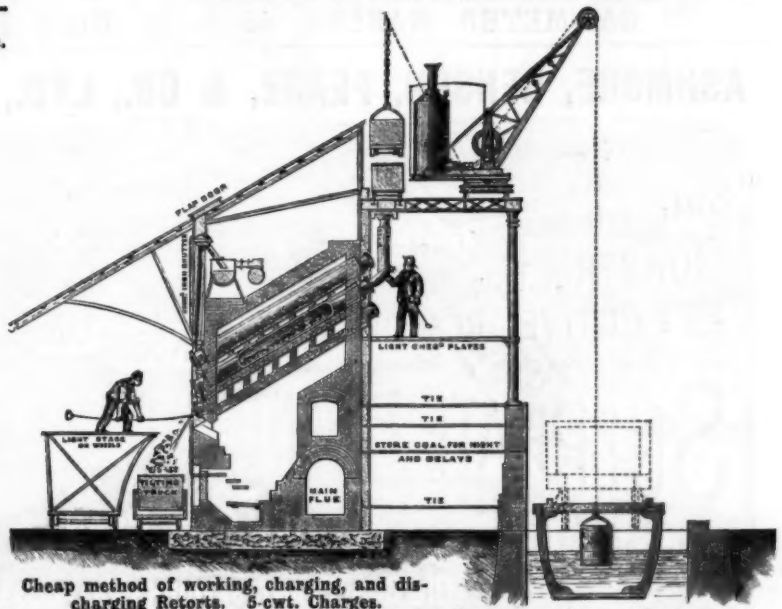
Section through Middle Retort and Furnace.



Section of old Retort-House converted, Two Sets 20 fts. in place of One. Modified form, with ordinary Retorts and Fittings.

Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 5-cwt. Charges. Section through Setting, Front to Back. Coal Barge or Railway. Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

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OF ALL FORMS AND SHAPES
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Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

Telegrams: "ATLAS SHEFFIELD."

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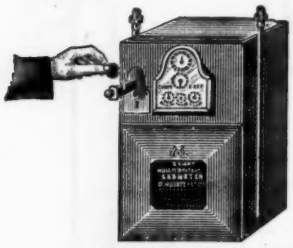
(PRICE'S PATENT).



This Meter has a simple Automatic arrangement fitted, whereby, upon the insertion of a shilling, a supply of gas can be obtained, and which is cut off on the quantity paid for being consumed. The Meter gives warning when the quantity is nearly exhausted, so that another shilling may be inserted. There is, however, no occasion to wait until this happens, as a second shilling can be inserted after two-pennyworth of the first shilling has been consumed.

The Meter is fitted with the ordinary registering dial, and has in addition a circular one divided showing twelve pence. On each Meter is marked the number of cubic feet it will pass for one shilling; and this can be arranged to cover cost of Meter-Rental, Fitting, and Gas consumed. These Meters are made of the best material and workmanship.

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SIMPLE IN CONSTRUCTION
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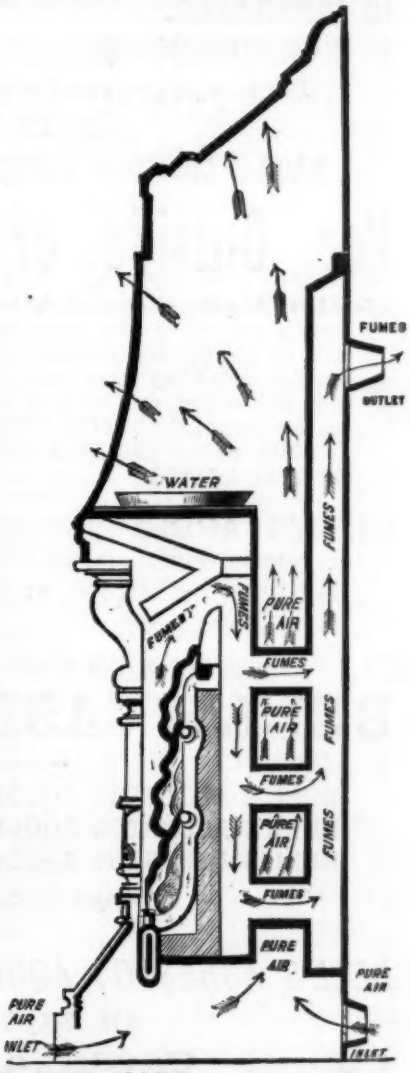

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PRICES.	No. 1.	No. 2.	No. 3.
Best black finished	£2 5 0	£2 15 0	£3 5 0
Best Berlin black finish	2 15 0	3 7 0	4 0 0
Top Panels Electro Nickelled, Brassed, or Copper Bronzed	2 15 0	3 7 0	4 0 0
Top Panels and Sides do.	3 3 0	3 15 0	4 8 0
Stove all do.	3 10 0	4 5 0	5 0 0

With Hand-Painted Tiles, 10s. to 20s. extra.

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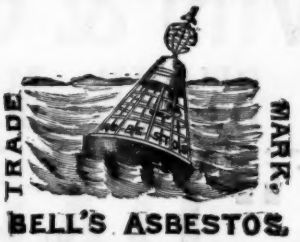

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IS WASHABLE.
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IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

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WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

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BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
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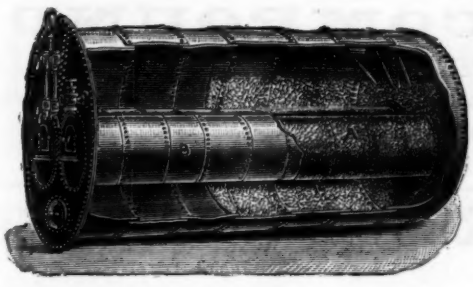
BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

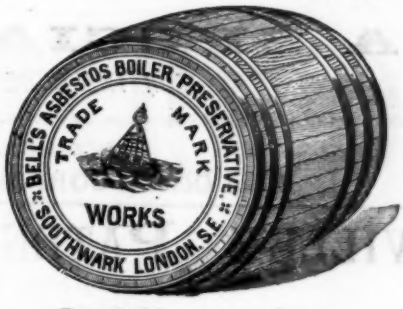
DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. BRISTOL: ROBERT STOTESBURY, 114, Redcliff Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS BOILER PRESERVATIVE

Will remove Incrustation from Steam-Boilers of all kinds without chipping.



A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.



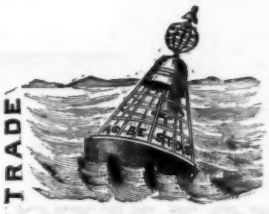
Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

QUANTITY REQUIRED. A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



DEPÔTS.
BARCELONA, and ANTWERP.
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
BRISTOL: ROBERT STOTESBURY, 114, Redcliff Street.
CARDIFF: BELL and Co., West Bute St.

SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

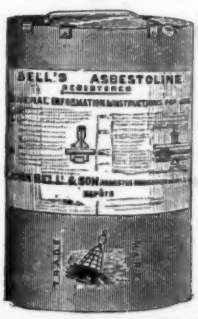
BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
Hydraulic Machinery, Accumulators and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.

BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRIGANT.

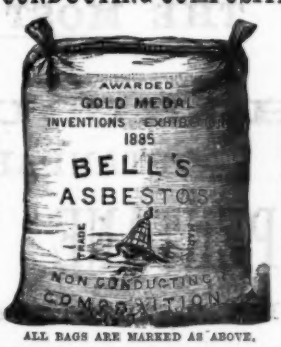


ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.
Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS, AND TAPE.
Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.

BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.

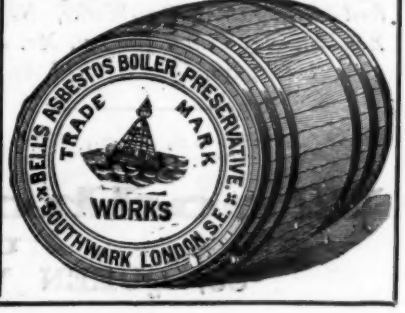
Will reduce loss by radiation and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE.
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

Head Office: CORPORATION STREET, BIRMINGHAM.

SAVILLE'S PATENT REGULATOR WASHER

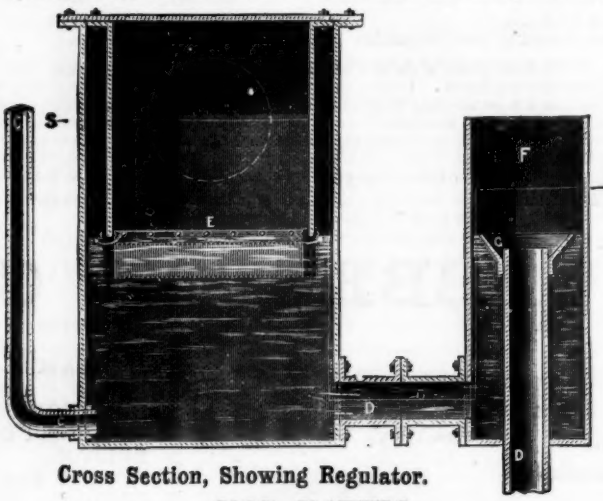
(As described in the JOURNAL OF GAS LIGHTING for Sept. 2, 1890.)

The only Washer without moving parts that can be fixed before an Exhauster.

No more Gas spoilt by over-running the Exhauster.

Perfectly Self-acting.

Particulars and prices on application.



Cross Section, Showing Regulator.

The only safe arrangement to work without Dip.

Less wear and tear on the Exhauster.

No moving parts.

Occupies small space.

State maximum make of Gas per diem.

SOLE MAKERS:

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

THE MOST RELIABLE STANDARD OF LIGHT

IS

HARCOURT'S

STANDARD

"PENTANE" LAMP.

No. 2.—Improved Type,

AS USED BY

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Prices, &c., from

IS

HARCOURT'S

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"PENTANE" LAMP.

No. 2.—Improved Type,

AS USED BY

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Prices, &c., from

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GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

"LIGHT, Wenham Gas Lamps MORE LIGHT."

ITS ADVANTAGES ARE:
IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.
INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.
Absence of Downward Shadow. *Practical Completeness of Combustion.*
CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.
CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: THE WENHAM COMPANY, LIMITED,
Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

GEORGE ORME & Co., Atlas Meter Works, OLDHAM.

Manufacturers of
IMPROVED WET AND DRY GAS-METERS, in Cast-Iron and Tin-Plate Cases.

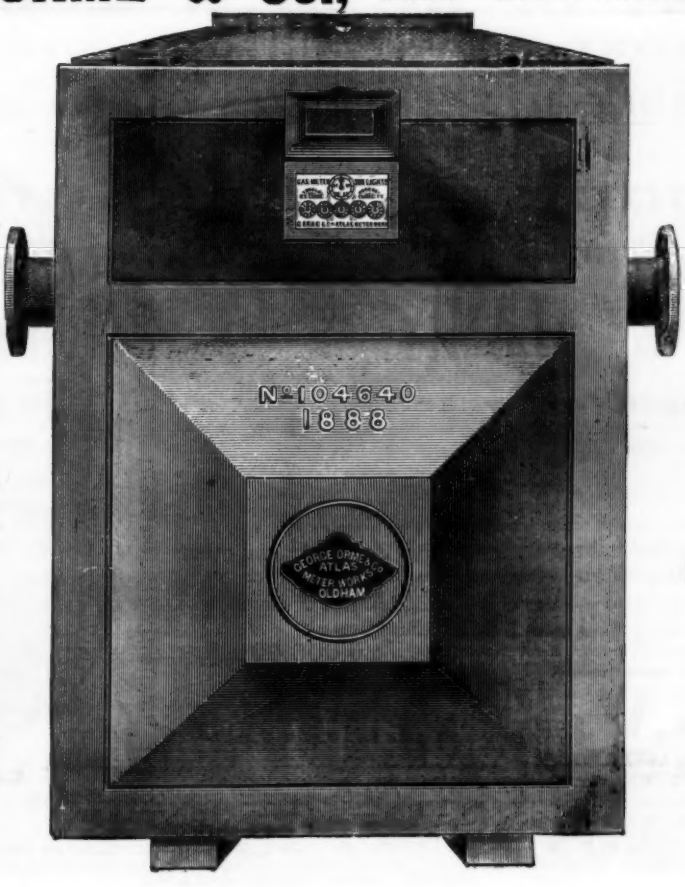
LAMP METERS.

PRESSURE GAUGES.

IMPROVED STREET LANTERNS of New Designs.

LAMP TORCHES.

GAS, WATER, AND STEAM FITTINGS of all kinds.



ORME'S GAS REGULATOR
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for Street Lamps.
Over 150,000 now in use.
Adopted by the Leading Gas Companies and Corporations.

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(BEHL'S PATENT)
for Domestic Use.

COLE'S PATENT SUSPENSION REGULATOR
for Regenerative Lamps, &c.

Illustrated Price Lists upon application.

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Two Thousand Boilers kept Clean

By using "CROSBIE'S COMPOSITION," which is absolutely harmless, and the most economical means of preventing Incrustation obtainable. Testimonials on application. Price in casks, 18s. 6d. per cwt., delivered free. Used at the following Gas-Works: Ascot, Birmingham, Broadstairs, Bromsgrove, Hendon, Kildwick, Knutsford, Leven, N.B., Pembroke, Seaham Harbour, Stamford, Warwick, &c., &c., and by leading Engineers throughout the Country.

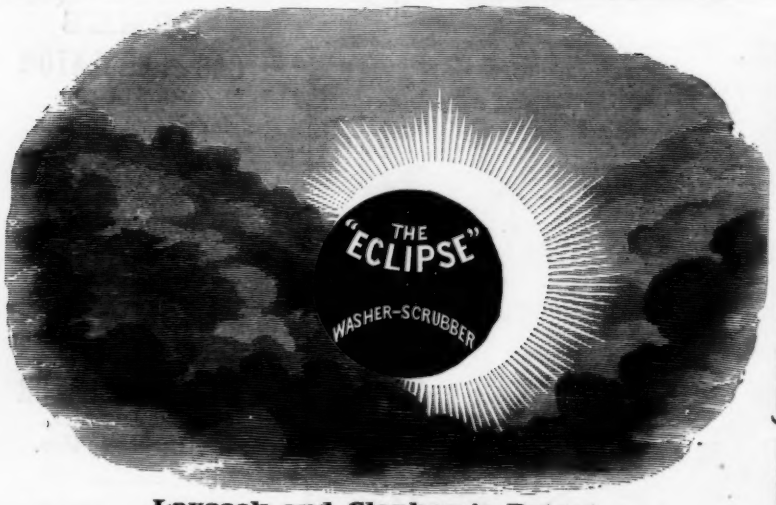
ADOLPHE CROSBIE, Walsall Street Chemical Works,
WOLVERHAMPTON.

RETORT SETTINGS IMPROVED
BY ADOPTING
THE "NUGENT" & "ROBUS" SETTINGS.

ECONOMY WITH DURABILITY GUARANTEED.
HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

Estimates and Particulars for every Description of Retort Extensions and other Work.

J. & H. ROBUS,
CONTRACTORS FOR GAS AND WATER WORKS,
20, BUCKLERSBURY, LONDON, E.C.



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The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.
MACHINES with a total capacity of **42,500,000** cubic feet now working, and give great satisfaction.
LAST YEAR 11 Machines erected with a total capacity of **20,000,000** *feet.*

Send for Descriptive Catalogue to the Sole Makers:
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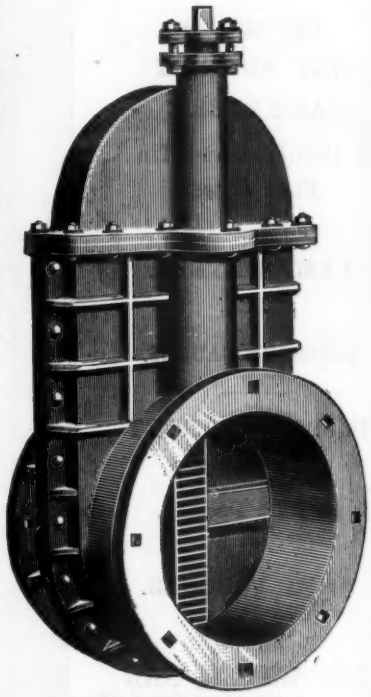
Mr. E. H. Wardwell, 10, Warren Street, New York, U.S.

SILVER MEDAL, Inventions Exhibition, 1885.



Clapham's Improved Internal Rack and Worm Valve, Gas-Mains, &c.

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